School to Work
CREATING FUTURE PATHWAYS

Vocational Learning in **Mathematics**

NEW SOUTH WALES
DEPARTMENT
OF EDUCATION
AND TRAINING

Vocational Education in Schools Directorate

Vocational Learning in Mathematics

"When students leave school, they should have employment related skills and an understanding of the work environment, career options and pathways as a foundation for, and positive attitudes towards, vocational education and training, further education, employment and life-long learning".

Adelaide Declaration on National Goals for Schooling in the Twenty-First Century (1999)

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Contents

1 Vocational and Enterprise Learning in Mathematics

1.1 Introduction 1
1.2 *School to Work: Creating Future Pathways 2005-2007* 1
1.3 Enterprise learning in Mathematics 2
1.4 Quality teaching in NSW public schools 3
1.5 Assessment for learning 3
1.6 Vocational learning syllabus links in the Mathematics curriculum 3
1.6.1 *Work, Employment and Enterprise* in the Mathematics Years 7-10 syllabus 3
1.6.2 *Key Competencies* in the Mathematics Years 7-10 syllabus 3
1.6.3 *Key Competencies* in the Mathematics Stage 6 syllabus 4
1.6.4 Vocational learning outcomes in General Mathematics Stage 6 4

2 Employment Related Skills in the Classroom

2.1 Employment related skills 5
2.1.1 Identifying employment related skills – a questionnaire for teachers 6
2.1.2 Examples of employment related skills developed in Mathematics Stages 4, 5 and 6 7
2.1.3 Sample unit of work annotated with employment related skills 8
2.2 *The Employment Related Skills Logbook* 15
2.2.1 Why use the logbook? 15
2.2.2 What's new in the 2005 logbook? 16
2.2.3 *The Employment Related Skills Logbook* overview 17
2.2.4 Models of logbook implementation in schools 23
2.2.5 Teacher examples: Logging employment related skills in the classroom 24
2.2.6 Teacher activity: Logging employment related skills in the classroom 31

3 Student Vocational Learning Activities

3.1 Mathematics student activities 33
3.1.1 Education and Training Pathways 34
3.1.2 Education and Training Pathways for a career relating to Mathematics 35
3.1.3 Jobs that need mathematics skills 36
3.1.4 Web Quest – mathematics, jobs and careers 39
3.1.5 Time sheet mathematics 41
3.2 Mathematics teaching unit: Consumer Arithmetic – Simple interest versus compound interest 44

4 Education and Training Pathways in Mathematics

4.1 Credit transfer arrangements 51
4.1.1 Credit transfer arrangements: HSC to TAFE NSW 51
4.1.2 HSC Mathematics courses and credit transfer arrangements 51
4.1.3 Credit transfer from TAFE NSW to university 53
4.2 Traineeships and apprenticeships 54
4.2.1 School Based Traineeships in NSW schools 55

5 Vocational and Enterprise Learning Resources

5.1 Employment related skills and their elements 57
5.1.1 Employment related skills mapping 63
5.2 Vocational learning resources for teachers and students 64
5.2.1 *myfuture.edu.au* 67
5.2.2 *The Real Game Series* 68
5.2.3 *Links to ReCaP* 69
5.3 Enterprise resources and activities 70
5.4 *Teachers in Business* – an opportunity for teachers 72

1. Vocational and Enterprise Learning in Mathematics

"Career building skills should not be taught as a separate subject but should be integrated with other curriculum subjects, such as maths, history ... Why are we learning these subjects if not to prepare for the rest of life? Let's put a context around these subject areas that adds greatly to the learning experience."

Phil Jarvis (2002)
Vice-President, Canadian Work/Life Centre

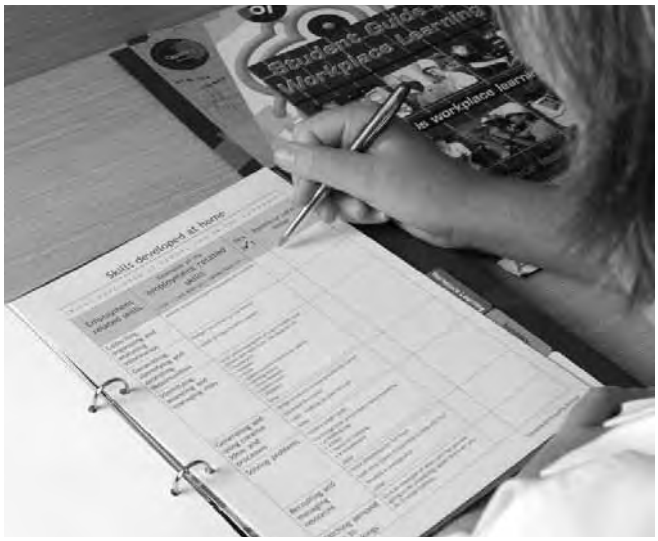
1.1 Introduction

Vocational learning is learning that addresses broad understandings of the world of work and develops in young people a range of knowledge, skills, competencies and attributes relevant to a wide range of work environments. Vocational learning provides students with the opportunity to make connections between school and the world beyond it.

Vocational Learning in Mathematics is a curriculum support tool for secondary school teachers within the Mathematics key learning area. This resource supports teachers in implementing the Mathematics Years 7-10 and Stage 6 syllabuses to identify and provide a range of opportunities for students to articulate the relevance of their curriculum learning to personal growth and future careers.

Vocational Learning in Mathematics also provides teachers with information and teaching strategies to support the implementation of the *Employment Related Skills Logbook*.

This booklet updates the existing *Vocational Learning in Mathematics* booklet provided to teachers in 2003.



1.2 *School to Work: Creating Future Pathways 2005-2007*

School to Work: Creating Future Pathways extends and builds on the successes of the *School to Work Program* implemented between 1999-2003 as part of the NSW Government commitment to support students in transition from school to post-school education, training and employment destinations.

School to Work: Creating Future Pathways recognises the impact on young people's life decisions in a world where ideas about work and practices in the workplace are changing rapidly. Students need to develop employment related skills and enterprising attributes that can be applied to a range of jobs and careers, and to be prepared to engage in lifelong learning.

School to Work focuses on four priority areas:

- Planning Transition Pathways
- Exploring Career Futures
- Strengthening Student Outcomes through Vocational Learning
- Building Networks and Connections.

1.3 Enterprise learning in Mathematics

Enterprising students possess the drive and commitment to identify, initiate, be resourceful and manage activities that are real and relevant to them both within school and the wider community. Enterprise learning develops students' personal and employment related attributes including the ability to be innovative and to successfully manage change.

The Enterprise Education Action Research (EEAR) project funded by the Australian Government (2002/2004) highlighted that *... the focus of enterprise education should be on students' learning as enterprising people, rather than on activity alone.*

Therefore, students will be encouraged to be enterprising when they are provided with opportunities of:

- **Student ownership** – students are given opportunities to have greater control of the learning experience rather than having decisions made for them – for example, negotiating tasks and related assessment criteria. This involves making the learning environment as real as possible so that students will become actively involved in and own what is occurring.
- **Experiential learning** – activities that allow students to learn by 'doing' both inside and outside the classroom. This will combine classroom learning and participation in the broader school community.
- **Cooperative learning** – students learn with and from each other including working in teams both inside and outside school boundaries. This includes the ability to exercise personal and shared responsibility, rather than being dependent on the teacher to solve problems and resolve issues.
- **Reflective practice** – opportunities for evaluation need to be built into the learning outcomes of the activity so students learn from their experiences.

In this respect, enterprise learning is not something new but something that needs to be made **more explicit** to students as they are learning, and needs to be **integrated into normal classroom practice**. In this way, students will be able to apply their wider school learning to real life situations thus making learning more authentic, relevant and engaging.

Effective partnerships between schools, parents, local business and industry are a key factor in the success of enterprise learning. The support and engagement of business and communities provide students with the opportunity to put their enterprising skills into practice.

Examples of enterprise learning in Mathematics courses could include students:

- planning, organising and running events such as sports carnivals
- operating a school-based business involving calculations, weights and measures, volumes and costs – for example, uniform shop, hydroponic vegetables
- organising and running a regular mathematics competition
- conducting and publishing surveys of student habits and preferences
- undertaking the *Young Achievement Australia Business Enterprise Program* where student teams form companies to market goods and services related to calculations and other areas of Mathematics
- implementing a volunteer project working with primary school students on numeracy
- organising the food ordering for the school canteen
- completing the virtual finances for the school practice firm.

List some examples of enterprise learning that your students are involved in/could be involved in:

My students are involved in/could be involved in:

Further information and student activities are provided in the *Employment Related Skills Logbook*.

1.4 Quality teaching in NSW public schools

Vocational Learning in Mathematics assists teachers to improve student outcomes by supporting the *Quality teaching in NSW public schools* model of pedagogy. It provides teachers with ideas, approaches, tools, resources and support materials that promote high levels of **intellectual quality**, a high **quality learning environment** and **significance** by connecting students with authentic learning contexts.

1.5 Assessment for learning

Vocational Learning in Mathematics provides support for teachers to plan and implement effective assessment for learning strategies. This includes the use of contemporary assessment strategies which are evidence-based and which help make learning more meaningful and important to students.

Student self-assessment and peer-assessment opportunities are encouraged through the use of tools such as the *Employment Related Skills Logbook* and activities from *The Real Game Series*, for example. Also encouraged are assessment strategies that involve authentic learning contexts that connect students with their world. Such strategies could include enquiry-based research assignments and projects and fieldwork activities involving students in work-based and community-based learning.

1.6 Vocational learning syllabus links in the Mathematics curriculum

1.6.1 *Work, Employment and Enterprise* in the Mathematics Years 7-10 syllabus

The NSW Board of Studies has included cross-curriculum content and student learning outcomes for *Work, Employment and Enterprise* in all new Years 7-10 syllabuses, including Mathematics. By addressing *Work, Employment and Enterprise* content, Mathematics teachers can assist students to develop important knowledge, understanding, skills, values and attitudes about work, employment and the workplace. Students can also be encouraged to engage with enterprise, service, community and work-based learning opportunities. *Vocational Learning in Mathematics* supports Mathematics teachers in addressing these syllabus outcomes.

1.6.2 *Key Competencies* in the Mathematics Years 7-10 syllabus

Key Competencies are generic competencies essential for effective participation in existing and emerging learning for future education, work and life. They are embedded in the NSW Board of Studies Mathematics Years 7-10 Syllabus.

The *Key Competencies* are:

- collecting, analysing and organising information
- communicating ideas and information
- planning and organising activities
- working with others and in teams
- using mathematical ideas and techniques
- solving problems
- using technology.

1.6.3 *Key Competencies* in the Mathematics Stage 6 syllabus

The *Key Competencies* embedded in the General Mathematics Stage 6 syllabus to enhance student learning are:

- collecting, analysing and organising information
- communicating ideas and information
- planning and organising activities and working with others and in teams
- using mathematical ideas and techniques
- using technology
- solving problems.

Course outcomes for the Mathematics, Mathematics Extension 1 and Mathematics Extension 2 courses include the development of the *Key Competencies*:

- communicating ideas and information
- using mathematical ideas and techniques
- solving problems.

1.6.4 Vocational learning outcomes in General Mathematics Stage 6

General Mathematics Stage 6 supports vocational learning outcomes by:

- providing opportunities for creative thinking, communication and contextualised problem solving
- assisting students to find positive solutions for a broad range of problems encountered in life and work beyond school
- providing a strong foundation for vocational pathways, either in the workforce or in further vocational training studies, and for university courses in the areas of business, the humanities, nursing and paramedical sciences.

2. Employment Related Skills in the Classroom

"People will have a portfolio, individually managed careers … Employees will also have to cultivate more transferable skills … and be constantly re-training."

Dr Jim Bright, University of NSW (2004)

2.1 Employment related skills

Employment related skills are generic skills which are transferable to the ever-changing work environment. These skills are developed throughout a person's life and in multiple settings, including work and life settings and educational contexts. Nine skills have been identified in the *Employment Related Skills Logbook*. They are:

Self-management	**Communication**	**Problem solving**
Initiative and enterprise	**Teamwork**	**Technology**
Learning	**Planning and organising**	**Cross-cultural understanding**

Employment related skills are highly valued by employers. Education programs that emphasise these skills offer students a comparative advantage in the labour market. These skills also support young people in becoming active citizens in their community.

Each teacher has a role to play in helping young people develop their employment related skills. For more information, the guide *5.1 Employment related skills and their elements* has been developed to support classroom teachers in identifying the employment related skills students are able to demonstrate by participating in curriculum activities.

2. Employment Related Skills in the Classroom

2.1.1 Identifying employment related skills – a questionnaire for teachers

Are you already teaching employment related skills in the classroom?

Students gain a variety of employment related skills in every subject. Complete this questionnaire to identify employment related skills you are already teaching to your students.

Do your students develop any of these skills in your classroom?
Tick and add to the list below.

Self-management

(✓) Are you teaching your students to:

- ❑ have clear personal goals and strategies
- ❑ be task-orientated and outcomes focused
- ❑ show interest, initiative and effort
- ❑ seek advice and support when required
- ❑ be pro-active in career planning, time management and setting challenges.

Initiative and enterprise

(✓) Are you teaching your students to:

- ❑ identify opportunities
- ❑ develop a strategic, creative, long-term vision
- ❑ show independence and initiative in identifying problems and solving them
- ❑ enjoy the challenge of new experiences.

Learning

(✓) Are you teaching your students to:

- ❑ learn in any setting
- ❑ identify and access learning sources and opportunities
- ❑ use a range of mediums to learn including mentors, peers, networking and information technology
- ❑ acknowledge the need to learn in order to accommodate change.

Communication

(✓) Are you teaching your students to:

- ❑ speak to a group confidently
- ❑ speak and write in another language
- ❑ follow verbal instruction
- ❑ select the appropriate communication form and style
- ❑ use verbal and non-verbal modes of communication.

Teamwork

(✓) Are you teaching your students to:

- ❑ understand how to operate in teams
- ❑ recognise and respect people's diversity, individual differences and perspectives
- ❑ establish group goals
- ❑ manage and resolve conflict when appropriate.

Planning and organising

(✓) Are you teaching your students to:

- ❑ take initiative and make decisions
- ❑ manage time and priorities
- ❑ establish clear project goals and deliverables
- ❑ collect, analyse and organise information, using appropriate methods.

Problem solving

(✓) Are you teaching your students to:

- ❑ anticipate, identify, clarify and frame problems
- ❑ develop and explore practical solutions
- ❑ analyse and assess information and situations
- ❑ implement solutions.

Technology

(✓) Are you teaching students to:

- ❑ gain a range of basic information technology skills
- ❑ manage and use technology
- ❑ understand the social implications of technology.

Cross-cultural understanding

(✓) Are you teaching your students to:

- ❑ understand and respect cultural and community diversity
- ❑ work with people of different ages, gender, race, religion
- ❑ show respect and concern for others
- ❑ interact with sensitivity and empathy.

2.1.2 Examples of employment related skills developed in Mathematics Stages 4, 5 and 6

Students gain a variety of valuable employment related skills in every subject they study. Here are some examples of employment related skills developed by students studying Mathematics courses in Stages 4-6.

Employment Related Skills	Students can … /Students are able to … /Students know how to …
Self-management Ability to take responsibility for setting and achieving personal goals	• design and implement an individual study guide for mathematics • make informed decisions and interpret and apply mathematics to a variety of contexts • develop and demonstrate perseverance in undertaking mathematical challenges • manage personal reactions to responsibilities and challenges in school, work and life • reflect on experiences and their consequences.
Initiative and enterprise Ability to seek/take advantage of opportunities	• investigate creative or alternative solutions or strategies when solving mathematical problems • use creative processes to solve unfamiliar problems such as those found in mathematics competitions • willingly take risks when working mathematically • seek, investigate and utilise a variety of resource materials and personnel.
Learning Ability to achieve new skills and/or knowledge	• link mathematical ideas to new situations • make generalisations about existing knowledge and understanding • verify mathematical relationships • become self-motivated learners through inquiry and active participation in challenging and engaging experiences • explore the application of mathematics to the real-world • develop a deep conceptual understanding of mathematical ideas and relationships.
Communication Ability to express and understand information	• explain the solution to a mathematical problem • write a mathematical proof • verbalise the reasoning used in arriving at a solution to a problem • use mathematical terminology and notation, algebraic symbols, diagrams, texts and tables to communicate mathematical ideas • critically examine and discuss mathematical concepts, problems and solutions • interpret diagrams • write procedures on how to construct shapes, graphs etc.

2. Employment Related Skills in the Classroom

Employment Related Skills	Students can … /Students are able to … /Students know how to …
Teamwork Ability to work effectively with others to get things done	• work in a team to solve a variety of mathematical and geometric problems • work with others in a team towards a common, agreed goal • take responsibility for developing and achieving group goals • cooperate with others, be responsive to others' ideas, take a collaborative approach to solve mathematical problems.
Planning and organising Ability to coordinate and prioritise tasks and resources	• plan the solution to a mathematical problem by selecting the most appropriate problem solving technique • organise the steps used to solve a problem into a logical sequence • collect, organise and analyse information presented in mathematical problems • collect, organise and analyse the results of mathematical experiments.
Problem solving Ability to identify problems and develop solutions	• use a variety of problem solving strategies to solve mathematical problems in different contexts • solve practical and real-world problems using mathematical techniques • evaluate mathematical solutions to make decisions or recommendations • decide what needs to be measured or calculated • develop alternate solutions to a problem.
Technology Ability to use appropriate technologies to complete tasks	• use calculators to solve mathematical problems • select and use appropriate software to investigate mathematical concepts and solve problems • research mathematical concepts using the Internet • present solutions to problems using appropriate software.
Cross-cultural understanding Ability to respect diversity and act without discrimination	• investigate the contribution of various cultures to our current understanding of mathematics • work cooperatively with people of different cultural backgrounds to achieve team goals.

2.1.3 Sample unit of work annotated with employment related skills

As you can see from completing the previous questionnaire, you are already teaching employment related skills in your classroom. The next step is to make it explicit in your current teaching programs. A simple way to start is to annotate a current teaching program with employment related skills. Overleaf is a sample unit and assessment activities provided by the NSW Board of Studies showing annotated employment related skills for you to use as a guide.

Stage 5.1 Unit: Trigonometry

5.1 Outcomes, Key Ideas and Content from the Syllabus

Measurement - Trigonometry — **Syllabus Content p 139**

Problem solving

MS5.1.2

Applies trigonometry to solve problems (diagrams given) including those involving angles of elevation and depression

Key Ideas

Problem solving

Use trigonometry to find sides and angles in right-angled triangles

Solve problems involving angles of elevation and angles of depression from diagrams

Working Mathematically Outcomes

Communication

Questioning	Applying Strategies	Communicating	Reasoning	Reflecting
Asks questions that could be explored using mathematics in relation to Stage 5.1 content	Analyses a mathematical or real-life situation, systematically applying problem-solving strategies	Uses mathematical terminology and notation, algebraic symbols, diagrams, text and tables to explain mathematical ideas	Explains and verifies mathematical relationships	Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 5.1 content

Knowledge and Skills

Trigonometric Ratios of Acute Angles

- identifying the hypotenuse, adjacent and opposite sides with respect to a given angle in a right-angled triangle in any orientation
- labelling the side lengths of a right-angled triangle in relation to a given angle eg the side c is opposite angle C
- recognising that the ratio of matching sides in similar right-angled triangles is constant for equal angles
- defining the sine, cosine and tangent ratios for angles in right-angled triangles
- using trigonometric notation eg sin A
- using a calculator to find approximations of the trigonometric ratios of a given angle measured in degrees
- using a calculator to find an angle correct to the nearest degree, given one of the trigonometric ratios of the angle

Technology

Trigonometry of Right-Angled Triangles

- selecting and using appropriate trigonometric ratios in right-angled triangles to find unknown sides, including the hypotenuse
- selecting and using appropriate trigonometric ratios in right-angled triangles to find unknown angles correct to the nearest degree
- identifying angles of elevation and depression
- solving problems involving angles of elevation and depression when given a diagram

Working Mathematically

- label sides of right-angled triangles in different orientations in relation to a given angle *(Applying Strategies, Communicating)*
- explain why the ratio of matching sides in similar right-angle triangles is constant for equal angles *(Communicating, Reasoning)*
- solve problems in practical situations involving right-angled triangles eg finding the pitch of a roof *(Applying Strategies)*
- interpret diagrams in questions involving angles of elevation and depression *(Communicating)*
- relate the tangent ratio to gradient of a line *(Reflecting)*

Technology

Cabri Geometry software can be used to explore similar triangles and ratios of sides. Spreadsheets can be used to generate tables of values for the trigonometric ratios.

Links

Geometry – similar triangles

Measurement – Pythagoras' theorem, measuring lengths

Number – ratio, rounding, average

Resources

Clinometer, measuring tape

List of References (p 48) – No.s 3, 4, 7

Language

The word trigonometry is derived from two Greek words meaning 'triangle' and 'measurement'. Students need to understand the meaning of 'opposite' and 'adjacent'.

5.2 Learning experiences and assessment activities

Learning Experiences

Review of Related Topics

For this unit of work, students will need to review their knowledge and skills in:

- Number – rounding a number to a stated number of decimal places
- Ratio including writing ratios and finding the missing value, x, given $\frac{x}{5}=\frac{3}{2}$.
- Geometry including angle sum of a triangle, complementary angles and similar figures
- Algebra including solving equations of the form $5=\frac{x}{3}$ and perhaps $4=\frac{3}{x}$
- Measurement – Pythagoras' theorem

Introduction to Trigonometry

Using measurements and calculation of the ratios opposite/hypotenuse, adjacent/hypotenuse and opposite/adjacent, students learn that in sets of similar right-angled triangles the ratios of pairs of sides are constant AND the ratio depends on the angles in the triangle, not the size of the triangle.

1. Students identify and label the sides of right-angled triangles, in various orientations, as being opposite, adj[illegible] in relation to a nominated angle, and use abb[illegible]p, adj, hyp. Students should relate the hyp[illegible] Pythagoras' theorem.
2. Groups of students are given a set of similar right-angled triangles printed on a worksheet eg Group 1 has a set of 20° right-angled triangles (all marked with a 20° angle and a right angle), Group 2 has 30° right-angled triangles etc. Students are asked to describe what they notice about the triangles in their set, concluding that the triangles are equiangular ie similar.
3. Students label the sides of the triangles as opp, adj a[illegible] the marked angle and measure each side to the nearest [illegible]
4. For each triangle in the set, the ratio opp/hyp is written as a f[illegible] and converted to a decimal correct to 3 decimal places.
5. Each group reports on their findings. They should discover that triangles with the same angles have approximately equal ratios. They also should be able to see that the ratio opp/hyp increases as the angle increases. A table is created on the board as follows:

Ratio Values by Measurement

Angle	Opp/Hyp	Adj/Hyp	Opp/Adj
20°			
30°			

6. Class discussion should emphasise that triangles that have the same ratios also have the same angles. The concept that for each similar right-angled triangle, the ratio of matching sides is constant should be reinforced.
7. The teacher introduces the names of the trigonometric ratios.
8. Students use their measurements to calculate the values for the second and third columns of the table. Patterns of values in the table can be discussed.

Teamwork
Problem solving

Communication

Assessment Activities

Open-ended Questions WM

Open-ended questions can be used to find out what students know and can do from earlier Stages. Students could work on such questions in pairs to encourage discussion of ideas. Listening to students' conversations provides valuable insights into their knowledge, skills and understanding. For example:

a write down everything you [illegible] about two similar f[illegible]

b describe how yo[illegible] equations like $\frac{a}{2}=$ [illegible] would determine if the solu[illegible]n is correct

c list 3 ratios that are equivalent to 3:4. Record a method for finding equivalent ratios.

d explain why the ratio of matching sides in similar right-angled triangles is constant for equal angles.

Problem solving
Communication

Writing Activities to Show Reflection WM

Students' responses could assist teacher [illegible]ment of the Working [illegible]atically outcomes. Group activities will promote students' development and use of terminology and give them the opportunity to consolidate understanding through discussion, reporting and questioning. Students can be encouraged to think about their learning by writing about the activity.

For example:

a write about the group activity in which you compared side lengths of similar triangles. Make sure you include what you have learnt from participating in this activity.

b write down everything you know about the sine, cosine and tangent ratios.

c draw a triangle with an unknown side length, place relevant information on the diagram, and describe how trigonometry can be used to find the value of the pronumeral.

Learning Experiences

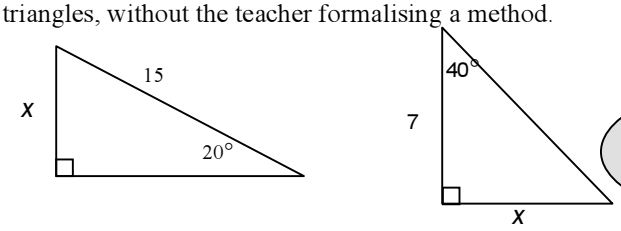
Technology

9. Students compare their results to answers obtained [illegible] find the ratios for each angle. A new table is written on [illegible] containing trigonometric ratios from the calculator, as follows:

Ratio Values from the Calculator

Angle θ	$\sin\theta = \frac{Opp}{Hyp}$	$\cos\theta = \frac{Adj}{Hyp}$	$\tan\theta = \frac{Opp}{Adj}$
20°			
30°			

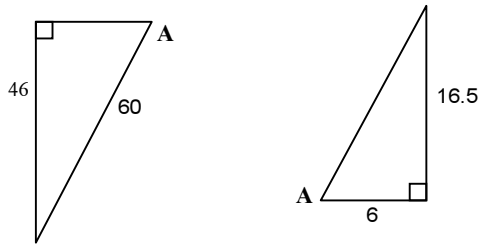
10. At this stage students could try to find the missing sides in the following triangles, without the teacher formalising a method.



Problem solving
Communication

Students could demonstrate their method of solution to the class. The aim here is to show the immediate application of the trigonometric ratios that have been developed in this lesson. Formal methods of setting out can be discussed in the next lesson.

11. If time allows, students could also use the table of values from the board to establish the value of angle A in the following triangles. (Note sides have been carefully chosen so that A is one of 20°, 30°…80°)



12. Students complete exercises reinforcing the skills of naming sides of right-angled triangles, writing sin, cos and tan ratios, and selecting the correct ratio.

Development and Application of Trigonometric Concepts

In the lessons that follow this introduction to Trigonometry, the teacher will need to guide the students to record their working clearly. A variety of exercises will reinforce knowledge, skills and understanding.

Students could:

- match a series of right-angled triangles to a set of written problems
- match cloze statements to diagrams to emphasise use of 'adjacent' and 'opposite' and the correct ratios to solve the unknown
- decide which trigonometric ratio is needed for a particular problem.

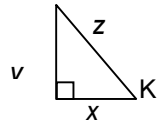
Assessment Activities

Problem solving

1. Sketch a right-angled triangle [illegible] has an angle of sixty degrees [illegible] hypotenuse of 8 metres.

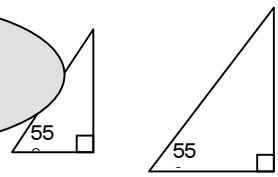
2. Complete these statements:

a) The side labelled ... is adjacent to angle K.



b) To solve the equation $0.765 = \frac{x}{9}$ I must

……



Explain why these two triangles are similar. WM

What else will be the same in each triangle?

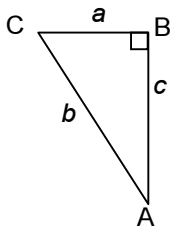
4. Which of these statements is true about ΔABC?

$\sin C = \frac{a}{b}$

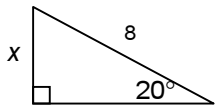
$\tan B = \frac{c}{a}$

$\cos A = \frac{c}{b}$

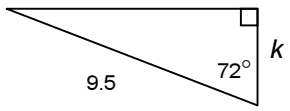
$\sin A = \frac{a}{c}$



5. Given $\sin 20^{o} = 0.342$ find the value of x in the diagram, correct to 1 decimal place.



6. Find the value of k, correct to 1 decimal place. Show all working.

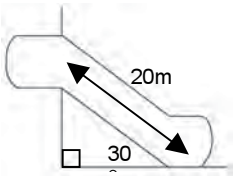


Learning Experiences

Development and Application of Trigonometric Concepts (continued)

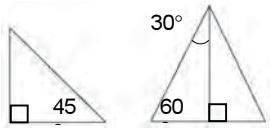
Students could:

- solve problems like: an escalator at an airport slopes at an angle of 30° and is 20 m long. Through what height would a person be lifted by travelling on the escalator?

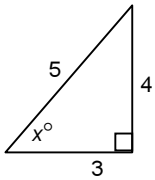


Problem solving

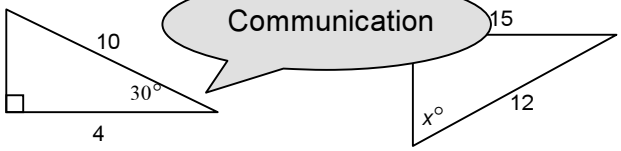
- investigate the lengths of the sides of the triangles illustrated



- find x in the diagram in three different ways

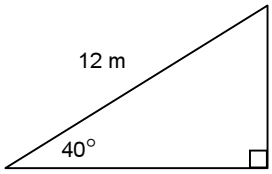


- explain what is wrong with these diagrams:

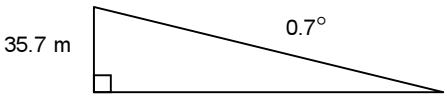


Communication

- use a clinometer and a measuring tape to investigate the height of trees and buildings in the school grounds
- solve problems involving angles of elevation and depression, with diagrams given, like
  a) The top of a flagpole is connected to the ground by a cable 12 metres long. The angle that the cable makes with the ground is 40°.
  Find the height of the flagpole.



  b) A ship's navigator observes a lighthouse on a cliff. She knows from a chart that the top of the lighthouse is 35.7 metres above sea level. She measures the angle of elevation of the top of the lighthouse to be 0.7°.



  The coast is very dangerous in this area and ships have been advised to keep at least 4 km from this cliff to be safe.
  Is the ship safe?

Assessment Activities

7. I used a calculator and found the tan ratio of a certain angle to be 1.234. What could the size of the angle be?

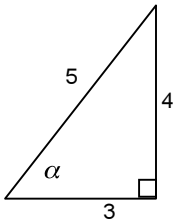
8. Toni wants to find the value of α in the triangle below. Which statement is a correct line of working?

$\sin\alpha = \frac{4}{5}$

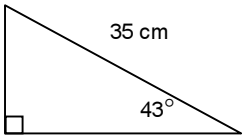
$\cos\left(\frac{3}{5}\right) = \alpha$

$\tan\alpha = \frac{3}{4}$

$\sin 0.8 = \alpha$



9. Find out everything you can about the right-angled triangle below. WM



Assessment Activity and Work Sample (see page 31) WM

Can Do Trigonometry

Students are asked to demonstrate what they understand and can do in relation to their work in trigonometry.

Students complete the attached worksheet.

Possible prompts:

- Why don't you draw a right-angled triangle to get started?
- Do you remember the names given to each side in relation to a marked angle?
- Can you write down the relationship for sin A in your diagram?
- Can you remember some types of trigonometry questions you did in class exercises?
- Can you use trigonometry to find an unknown side? An unknown angle?
- In part 2, what do you think is meant by the words 'practical problems'?
- Can you extend your response by creating and solving more difficult questions in part1? part 2?

3.5.3 Assessment activity and work sample

Focus: Measurement and Working Mathematically

Can Do Trigonometry

Students are asked to demonstrate what they understand and can do in relation to their work in trigonometry.

Students complete the worksheet on page 32.

From *Securing Their Future: Mathematics*

Individual

35 minutes

Unit End

Possible prompts to assist student engagement

- Why don't you draw a right-angled triangle to get started?
- Do you remember the names given to each side in relation to a marked angle?
- Can you write down the relationship for sin A in your diagram?
- Can you remember some types of trigonometry questions you did in class exercises?
- Can you use trigonometry to find an unknown side? an unknown angle?
- In part 2, what do you think is meant by the words 'practical problems'?
- Can you extend your response by creating and solving more difficult questions in part1? part 2?

Suggested Materials

pen and paper
calculator
worksheet

Outcomes

Trigonometry (MS5.1.2)
Applies trigonometry to solve problems (diagrams given) including those involving angles of elevation and depression
Applying Strategies (WMS5.1.2)
Analyses a mathematical or real-life situation, systematically applying problem-solving strategies
Communicating (WMS5.1.3)
Uses mathematical terminology and notation, algebraic symbols, diagrams, text and tables to explain mathematical ideas
Reasoning (WMS5.1.4)
Explains and verifies mathematical relationships

Criteria for judging quality of performance

The student may demonstrate the following:

- expresses the three ratios in terms of sides eg $\sin = \frac{\text{opposite}}{\text{hypotenuse}}$
- creates and solves routine trigonometry questions that involve finding an unknown side
- creates and solves routine trigonometry questions that involve finding unknown sides and angles
- creates and solves practical problems which involve finding unknown sides
- creates and solves problems involving angles of elevation or depression given a diagram
- creates problems including those involving angles of elevation and depression.

Problem solving
Technology

Feedback

Students will receive:

- possible prompt questions related to the assessment activity to assist their engagement
- written feedback on individual responses to indicate evidence of understanding of each of the trigonometric ratios and their use to find sides and angles in right-angled triangles
- specific advice about strategies to further consolidate knowledge, skills and understanding, and suggestions for completing related additional tasks
- oral feedback (to the class and individuals) related to the overall understanding of the concepts and misconceptions about the mathematical ideas.

Can Do Trigonometry

In the examples below, you are asked to demonstrate that you can do something, **by doing it**.

In each case, **you** get to pick the examples that you think will show that you can do what has been asked.

1. **I can** understand and use the trigonometric ratios (sine, cosine, tangent) in right-angled triangles:

2. **I can** use trigonometry to solve practical problems involving right-angled triangles:

2.2 *The Employment Related Skills Logbook*

The Employment Related Skills Logbook is a central element of the NSW Government's *School to Work: Creating Future Pathways*. This logbook has been developed as a means of enhancing students' understanding of the employment related skills they are developing at school and in the community throughout their school years and recording their individual school to work transition planning.

The logbook is a:

- planning tool for students to document employment related skills
- tool for teachers/schools to monitor a student's personal growth and responses to their current learning and future choices
- source of vocational and enterprise learning activities
- source of career/transition references
- tool that encourages students to self-manage their personal career journey
- storage folder for certificates and other important documents
- resource to help students prepare a résumé
- useful tool for schools to use when writing school leaver references.

A CD-ROM is provided in each logbook which contains electronic templates of all pages, allowing teachers and students to print off additional pro-formas and edit pages to suit students' needs.

The Employment Related Skills Logbook is a flexible resource for students to collect evidence and document their vocational learning experiences. Each logbook will vary in its collection of content as each individual student has different ideas and aspirations for their future. Ideally, the logbook should be a mix of teacher-directed materials and evidence of student's self-managed transition planning and skills development.

2.2.1 Why use the logbook?

Use of the logbook is consistent with the key directions of the Board of Studies *K-10 Curriculum Framework* and new syllabuses. It is a tool which supports the implementation of the *Work, Employment and Enterprise* cross-curriculum content statement in all new Years 7-10 syllabuses.

The logbook:

- provides teachers with a practical tool for engaging students in self-assessment and peer-assessment, which are features of the new Years 7-10 syllabuses. Such exemplary assessment practices provide opportunities for students to assume responsibility for their own learning which provides a sound basis for personalised learning
- supports teachers in implementing vocational learning across all Stage 5 and 6 key learning areas in line with the *Key Competencies*
- supports the *Quality teaching in NSW public schools* model by enabling classroom teachers to demonstrate to students how their subject develops the skills needed for life after school. It enhances the relevance of all activities students participate in during their school years both inside and outside the classroom
- addresses the demand from employers worldwide for young people to develop generic work skills
- supports contemporary career development practice, which encourages all individuals to develop the capacity to self-manage their careers from a young age.

2.2.2 What's new in the 2005 logbook?

The logbook has been updated to reflect feedback provided by schools. Below is a list of the major changes:

- **Revised employment related skills for Years 9-12**
  The new employment related skills are based on the Employability Skills Framework developed by a project that gathered the views of industry on the critical generic skills required to facilitate employability in Australian workplaces.
- **A description of each skill and how it is demonstrated in the classroom context**
  It is crucial that students have the ability to articulate how they have demonstrated these skills throughout their school and community experiences.
- **New enterprise learning section**
  Activities in this section centre on enterprising attributes and students identifying those attributes within themselves.
- **Revised log sheets**
  The new format allows students to describe the learning experience, identify employment related skills, record examples of how skills were demonstrated and then reflect on the activity or process. The new format assists students to self-manage the process.
- **Improved student instructions and activities**
  Instructions allow students to complete activities independently and self-manage the use of the logbook away from school. Of particular interest are the step-by-step instructions for using the Summary section.
- **Graphics to enhance appeal to students**
  The revised pages are visually appealing for students and show a mix of illustrated pages and plain pages.
- **Introduction section renamed Student section**
  Student section better reflects the focus on providing students with activities relating to self and career exploration to enable them to plan for their futures.
- **CD-ROM supplied with each logbook**
  All templates are provided in Microsoft Word format.
- **New press binder fitting to fasten the Résumé Section.**

2.2.3 *The Employment Related Skills Logbook* overview

The Employment Related Skills Logbook content is designed to encourage students to identify and record their vocational learning experiences. There are eight sections of the logbook which are: Student, Classroom, School & Community, Workplace Learning, Enterprise Learning, Summary, Blank and Résumé. The overview below provides teachers with information regarding the intention of each section and includes suggested strategies for use and guides to facilitation.

Student Section	
Overview	**Who?**
• Contains activities relating to self and career exploration. This section can be used by schools to monitor students' progress with their current learning and its relevance to future choices. • Students can use this section to file research materials and activities regarding their planning processes for their futures. • The Student Section can also be used in careers lessons.	May be facilitated by: • members of the School to Work team • Year adviser • careers adviser.
What's in the Student Section?	**Suggested strategies for using the Student Section**
This Is Me Now activity	An activity for students to reflect on their current life situation and where they would like to be in the future. It is a starting point for students in their school to work planning.
Career research activity using the *myfuture* website	An introduction to the website **www.myfuture.edu.au.** Printed sheets from the *My Guide* section of the website can be stored in the Student Section of the logbook (eg *My Summary*).
Action Plan for students to familiarise them with the process of goal setting	The Action Plan is designed for students to complete at the start of a year, semester, term, week or day. It's a flexible activity that can assist students in their planning processes. There is also an Action Plan in the *My Guide* section of **www.myfuture.edu.au** under *Planning*.
Tracking Sheets for Years 9-12	The Tracking Sheets can be used for school-based tracking, school to work interview processes and student's personal use. The preliminary and HSC Tracking Sheets also monitor subject selection to align with NSW Board of Studies requirements.
Exit Plan for school leavers	The Exit Plan can be worked through with a student who is thinking of leaving or will be leaving school. Designed to be completed and actioned in the last few weeks of school. Students can also file their Student Feedback Report from the *School to Work Program Student Survey* in the Student Section.

2. Employment Related Skills in the Classroom

Classroom Section	
Overview	**Who?**
Introduces the process of logging employment related skills (ERS). The Classroom Section enables teachers to incorporate vocational learning outcomes into their lessons.	• Facilitated by Key Learning Area (KLA) teachers. It is intended that classroom teachers incorporate the process of logging ERS into their teaching programs. • KLA teachers have discretion as to the frequency of logging ERS in their lessons.
What's in the Classroom Section?	**Suggested strategies for using the Classroom Section**
Employment related skills in the classroom for Years 9-12	Definitions for each of the ERS to enhance students' understanding of what they mean. This page can be a reference to assist in completing log sheets.
Activities and examples of employment related skills in the classroom for Years 9-12	Teacher and student examples of how to document ERS demonstrated by students in the classroom. They are preliminary activities and sources for logging ERS.
Sample classroom log sheet	A worked example to assist students in understanding how to log ERS developed in their courses.
Classroom log sheets	Used by students to log the ERS learned in the classroom. Students reflect on the Classroom Activity, Topic, Assignment or Unit then document how three ERS were demonstrated. Students can also reflect on the learning experience.
Computing skills student/teacher assessment	This is a checklist of the skills that students would be expected to display as a result of the ICT cross-curriculum content statement in all new Years 7-10 syllabuses. It assists KLA teachers to determine the extent to which ICT content is addressed in their programs. The resource *ReCaP* provides many student activities on employability skills which align with ERS outlined in the logbook.

School & Community Section	
Overview	**Who?**
• This section gives students the opportunity to record and document their participation in activities outside the classroom and log the employment related skills (ERS) developed in those activities. • It is assumed that students have worked through the Classroom Section and are familiar with the process of logging ERS. The intention is for students to be confident to self-manage logging their ERS for school and community activities.	May be facilitated by: • classroom teacher • careers adviser • Year adviser • School to Work team member.
What's in the School & Community Section?	**Suggested strategies for using the School & Community Section**
Summary of participation and achievements	A checklist for students to list the school and community activities that they have participated in. It may also prompt students to become involved in activities that they may not have thought of.
School & Community log sheet	Same format as the Classroom log sheet. See notes under Classroom log sheet.

Workplace Learning Section	
Overview	**Who?**
• This section gives students the opportunity to focus on the ERS developed through workplace learning experiences. • The intention is for students to work through this section at the time of participation in workplace learning.	May be facilitated by : • careers adviser • VET teacher • School to Work team member.
What's in the Workplace Learning Section?	**Suggested strategies for using the Workplace Learning Section**
Examples of workplace learning	This page is to prompt discussion regarding examples of workplace learning. It includes a list of personal attributes that employers seek in employees as well as providing examples of ERS gained from workplace learning.
Workplace learning research	This activity is designed to assist students to make informed decisions about their workplace learning and focus on what they would like to get out of the experience.
Workplace learning log sheet	Similar to other log sheet pro-formas. This sheet incorporates details of the employer and workplace.

Enterprise Learning Section	
Overview	**Who?**
A new section in the 2005 version of the mainstream logbook. This section highlights the value of authentic learning through enterprise education. It also provides activities and links to many useful resources and programs. This section may also house other worksheets/information/resources relating to enterprise learning. **Note:** Section 5 of the resource *ReCaP* contains a section on enterprise learning and activities that could be used in conjunction with those in the logbook.	May be facilitated by: • KLA teachers • careers advisers • School to Work coordinators • students, who may take the initiative to research enterprise activities and programs themselves and participate.
What's in the Enterprise Learning Section?	**Suggested strategies for using the Enterprise Learning Section**
An enterprising person	A series of attributes that contribute to an enterprising person. This page can be used to discuss the nature of enterprise learning.
Enterprise profile	A research activity for students to understand the attributes and qualities of an enterprising person. The profile prompts students to write about the person's job/role and look at all the varied activities the person is involved in. Students can use the internet or interviews to compile the relevant information.
Student enterprise survey	The survey was designed as an assessment tool through the *Enterprise Education Research Project* (DEST 2004). Students can complete the questionnaire to assess their enterprising attributes so they gain an insight into their strengths and areas for development.
Enterprise survey evaluation	The survey evaluation is an opportunity for students to look at their responses from the survey and reflect on their strengths and areas for development.
Project based enterprise learning	A project based enterprise learning activity.
Enterprise activities	Examples of enterprise learning activities sorted by KLA.
More enterprise activities	Enterprise web site resources.
Enterprise learning log sheets	Students use these sheets to log their employment related skills demonstrated through enterprise learning activities.

Summary Section	
Overview	**Who?**
This section allows students to summarise their employment related skills (ERS) by collating skills from all their log sheets.	May be facilitated by: • careers adviser • VET teacher • School to Work team member.
What's in the Summary Section?	**Suggested strategies for using the Summary Section**
Summary of employment related skills	These pages are for students to collate their ERS from all completed log sheets. This process will enable students to create a dossier of ERS to be used in the preparation of résumés, applications for jobs or for further education.
Blank Section	
Overview	**Who?**
The Blank Section is an area for students to file additional activities related to their transition planning. These may include: • specific vocational learning classroom activities • logbook assignments and or homework • work for *The Real Game* series • **www.myfuture.edu.au** research or • any careers related research. The statement page after the cardboard tab is meant to be taken out once the space is used. Students can write the title of this section on the cardboard tab.	This section may be student or teacher managed.

myfuture
Australia's career information service
myfuture.edu.au

the Real game series™

Résumé Section	
Overview	**Who?**
The Résumé section helps students write a résumé and compile their portfolio.	May be facilitated by: • KLA teacher • careers adviser • Year adviser.
What's in the Résumé Section?	**Suggested strategies for using the Résumé Section**
Tips for setting out a résumé/portfolio	This page outlines a few tips for students as a starting point for discussion on how to plan or write a résumé. For further information students can log on to **www.myfuture.com.au.**
Résumé cue cards	These are designed to be cut up into squares and are "reminders" for where documents are to be filed in the future. These pages are a guide to help students write their résumé. Students should be encouraged to look at different types and formats of résumés to create an individual document.

2.2.4 Models of logbook implementation in schools

There is no single or preferred model for implementation of the *Employment Related Skills Logbook* as each school responds to the diverse needs of their students.

Ultimately, the goal is for students to be competent self-managers of their career path and planning and this would include, as a key element, effectively using and managing the logbook. The guidance and support of teachers in this process is critical to individual student success.

The models below indicate how the logbook is currently being managed by schools.

MODEL 1	The classroom unit is taught to students through a variety of learning and assessment strategies. Logging of employment related skills is completed at the end of the unit and the log sheet is filed into the logbook.
MODEL 2	Logging of employment related skills is completed once a week throughout the unit of work. Various activities and/or assignments are logged and log sheets are filed in the logbook.
MODEL 3	Unit of work is taught to students. Careers adviser manages the logging of employment related skills of selected lessons/subjects in careers lessons.
MODEL 4	The school timetables a *School To Work* week, once a term. Employment related skills are logged in each lesson for the duration of that week.

2.2.5 Teacher examples: Logging employment related skills in the classroom

Mathematics Stage 5.1

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics Stage 5.1 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
NS5.1.2 Consumer Arithmetic				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☐ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☑ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Problem solving*	• *read and interpret pay slips* • *interpret spreadsheets or tables when comparing simple interest and compound interest over time periods*			
Skill: *Technology*	• *make informed decisions related to purchases e.g. best mobile plan* • *use a calculator to calculate earnings including wages, salary, commission* • *use a spreadsheet to prepare a budget*			
Skill: *Planning and organising*	• *plan and organise the cost of going on a school camp* • *collect, analyse and compare employment conditions from different careers – for example, employment rates, payment*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students can confidently explain the different types of earnings to my class.* • *Students are more aware of what to look for when making decisions about buying goods.*				

Mathematics Stage 5.1

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics Stage 5.1 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
DS5.1.1 Data Representation and Analysis				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☑ Problem solving	☑ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Communication*	• *construct frequency tables and graphs from data* • *read and interpret information from graphs and tables* • *discuss ethical issues in the use of data*			
Skill: *Problem solving*	• *analyse statistical data represented in tables or graphs* • *organise collected data into appropriate groups* • *draw statistical conclusions from collected data*			
Skill: *Technology*	• *use the statistics mode on the calculator to perform calculations on data* • *use a spreadsheet to analyse real life data – for example, heights of students in the school*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students learnt how to use a spreadsheet to manipulate data.* • *Students can understand how easily data can be manipulated to convey a message.*				

2. Employment Related Skills in the Classroom

Mathematics Stage 5.2

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics Stage 5.2 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
PAS5.2.3 Coordinate Geometry (using the gradient, midpoint and distance formulas)				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☑ Problem solving	☑ Technology	

Describe how three of these skills were demonstrated

Students can … /Students are able to … /Students know how to …

Skill: *Problem solving*

- *use the appropriate formula to solve a problem on the number plane*
- *use appropriate formulas to determine and justify the type of triangle formed by three points*

Skill: *Communication*

- *draw a straight line graph given its equation*
- *explain the relationship between the definition of gradient and the gradient formula*
- *explain the meaning of each pronumeral in a formula*

Skill: *Technology*

- *use a calculator to calculate the gradient, midpoint and distance given two points*

Reflection on Learning Experience ☑

Comment on one or more of the following:

☑ areas of success	☐ areas for improvement	☐ further research

- *Students understood and were able to explain the relationship between Pythagoras' Theorem and the distance formula.*

Mathematics Stage 5.3

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics Stage 5.3 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
MS5.3.2 Trigonometry				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☑ Problem solving	☑ Technology	

Describe how three of these skills were demonstrated

Students can … /Students are able to … /Students know how to …

Skill: *Problem solving*

- *solve problems using the exact ratios for 30°, 45° and 60°*
- *solve practical surveying problems using the sine and cosine rules*
- *use the appropriate trigonometric ratios and formulas to solve problems involving two triangles*

Skill: *Communication*

- *explain what happens when the sine and cosine rules are used in right angled triangles*
- *draw the sine and cosine curves given the equation*
- *write a proof using the relationship between trigonometric ratios*
- *draw a diagram to represent a trigonometric word problem*

Skill: *Technology*

- *use a calculator to find the anglels given the trigonometric ratio*
- *use a graphics calculator to draw the sine and cosine curves*

Reflection on Learning Experience ☑

Comment on one or more of the following:

☑ areas of success	☐ areas for improvement	☐ further research

- *Students need to remember that if the sine of an angle is more than 1 then there are two possible answers.*
- *Students understand and can draw the diagrams for a word trigonometric problem.*

2. Employment Related Skills in the Classroom

Mathematics General Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics General Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Data collection and sampling				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☑ Problem solving	☑ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Communication*	• *prepare and present oral and written reports* • *discuss the reasonableness of conclusions from the data collected* • *represent information in symbolic, graphical and tabular form* • *justify a response to a given problem using mathematical terminology*			
Skill: *Technology*	• *design a survey to collect raw data* • *organise collected data into a spreadsheet* • *represent collected data in graphical form*			
Skill: *Problem solving*	• *distinguish between different types of data* • *determine the most appropriate method to represent collected data*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students will be able to conduct a survey and evaluate the effectiveness of data sampling.* • *Students will be able to use a spreadsheet to collate data and represent it in graphical format.*				

2. Employment Related Skills in the Classroom

Mathematics and Mathematics Extension 1 Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics and Mathematics Extension 1 Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Application of calculus to the physical world				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Communication*	• *communicate information in graphical form* • *write the solution to a problem using clear, concise mathematical terminology*			
Skill: *Planning and organising*	• *organise information into a logical sequence of events* • *analyse information in problems relating to real world situations*			
Skill: *Problem solving*	• *use appropriate mathematical formulae and techniques to solve the problem in context* • *use creative processes to match mathematical concepts with real life problems*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students will be able to apply mathematical concepts to real life problems and events.*				

2. Employment Related Skills in the Classroom

Mathematics Extension 2 Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Mathematics Extension 2 Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Mechanics				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Problem solving*	• *derive an equation from given data* • *apply appropriate mathematical formulae to solve motion problems* • *analyse graphical information*			
Skill: *Communication*	• *describe in mathematical terms the physical path of an object* • *represent the path of an object moving in simple harmonic motion in graphical form*			
Skill: *Planning and organising*	• *assess the appropriate formulae needed to solve real world problems* • *plan and organise the solution to a real-world problem into a logical sequence of steps*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students use problem solving skills to a range of real-world examples.*				

2.2.6 Teacher activity: Logging employment related skills in the classroom

Using the examples provided in this section:

1. Identify an activity, topic, assignment or unit of work you teach to your students
2. Of the nine employment related skills, tick the ones that you feel students have demonstrated in this activity/topic/assignment/unit
3. Choose three of these skills and describe how each skill has been demonstrated (refer to 5.1 *Employment related skills and their elements*)
4. Reflect on students' learning and identify an area of success, of further improvement or further research that you feel students can document.

This is the process that students undertake in documenting their employment related skills in their *Employment Related Skills Logbook.*

Classroom Activity, Topic, Assignment or Unit				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☐ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☐ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: _____				
Skill: _____				
Skill: _____				
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☐ areas of success	☐ areas for improvement	☐ further research		

3. Student Vocational Learning Activities

"Vocational learning is general learning that has a vocational perspective. It includes elements such as general employability skills, enterprise education, career education and community and work-based learning. All students should experience vocational learning at each year level throughout their schooling."

MCEETYA framework for vocational education and training in schools – policy directions (2001)

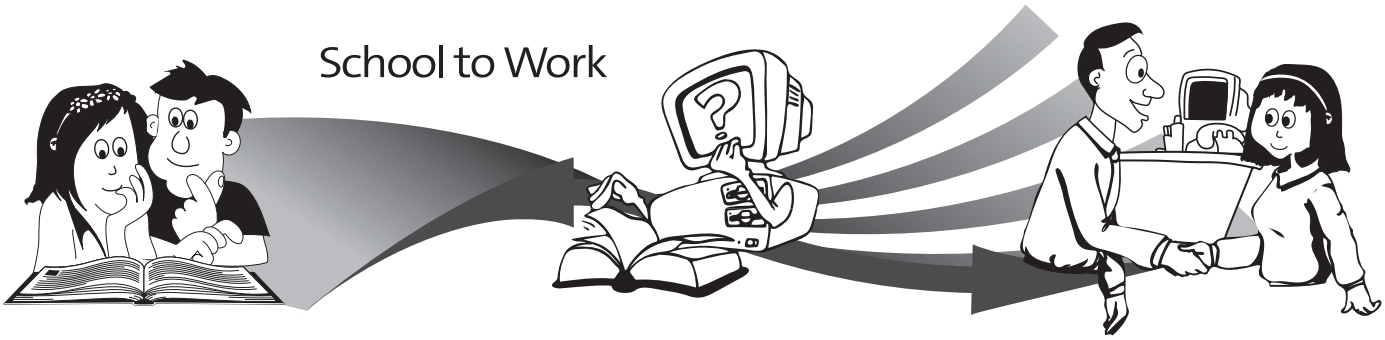
3.1 Mathematics student activities

Vocational learning is every teacher's business and it should be integrated into everyday teaching and learning. Effective teaching and learning is enhanced by providing access to environments within and beyond the classroom which link student learning to personal, social and work contexts. Students need to have an understanding of the work environment, career options and career pathways, life-long learning and how their employment related skills support both career and life pursuits.

The following pages provide student activities and a teaching unit to support you in incorporating vocational learning in your curriculum. This material has been developed by your colleagues as a starting point for you to create and develop other curriculum activities that support vocational and enterprise learning for your students.

For additional vocational learning activities, please refer to the 2003 edition of *Vocational Learning in Mathematics.*

3.1.1 Education and Training Pathways



COMPULSORY EDUCATION YEAR 10

HSC

General and Vocational courses
Vocational Education and Training courses include: TAFE VET and SCHOOL VET and School based part-time traineeships.

credit transfer

TAFE

Year 10 TAFE entry

UAI not as anticipated

UAI

UAI not as anticipated

No UAI

credit transfer

UAI as anticipated

credit transfer

University linked Course or College

Bridging course alternative entry course/program/ college with direct credit links

Private College

Certificate or Diploma

TAFE

Year 12 TAFE entry

Certificate or Diploma

Work plus on-the-job training

EG: Traineeship Apprenticeship or Cadetship

Certificate Diploma or Degree

credit transfer

credit transfer

University

credit transfer

University (Full fee paying)

credit transfer

University Degree

credit transfer

JOB

TRADE

ENTERPRISE

WORK

OFFICE

CAREER

PROFESSION

3.1.2 Education and Training Pathways

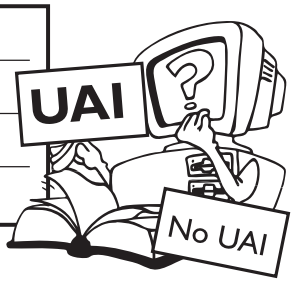
FOR A CAREER RELATING TO ***Mathematics***

Student Activity:

1. Go to the bottom of the page. Write in the name of an interesting job or career that relates to the field of Mathematics.
2. Write your school subjects in the boxes provided.
3. Refer to the Education and Training Pathways sheet and do some research on courses that may lead to your chosen career.
4. Draw arrows from the subject boxes to map two pathways that lead to this career.
5. Fill in the shaded boxes with the information you find.

MY SCHOOL CERTIFICATE SUBJECTS

MY HSC COURSES



TAFE
Year 10 entry certificate
Course Name:
Campus:

Private College
Course Name:
College:

University linked Course or College
Course Name:
University linked to:

TAFE
Year 12 or equivalent entry
Course Name:
Campus:

Work
plus on-the-job training
Industry:
Training Program:

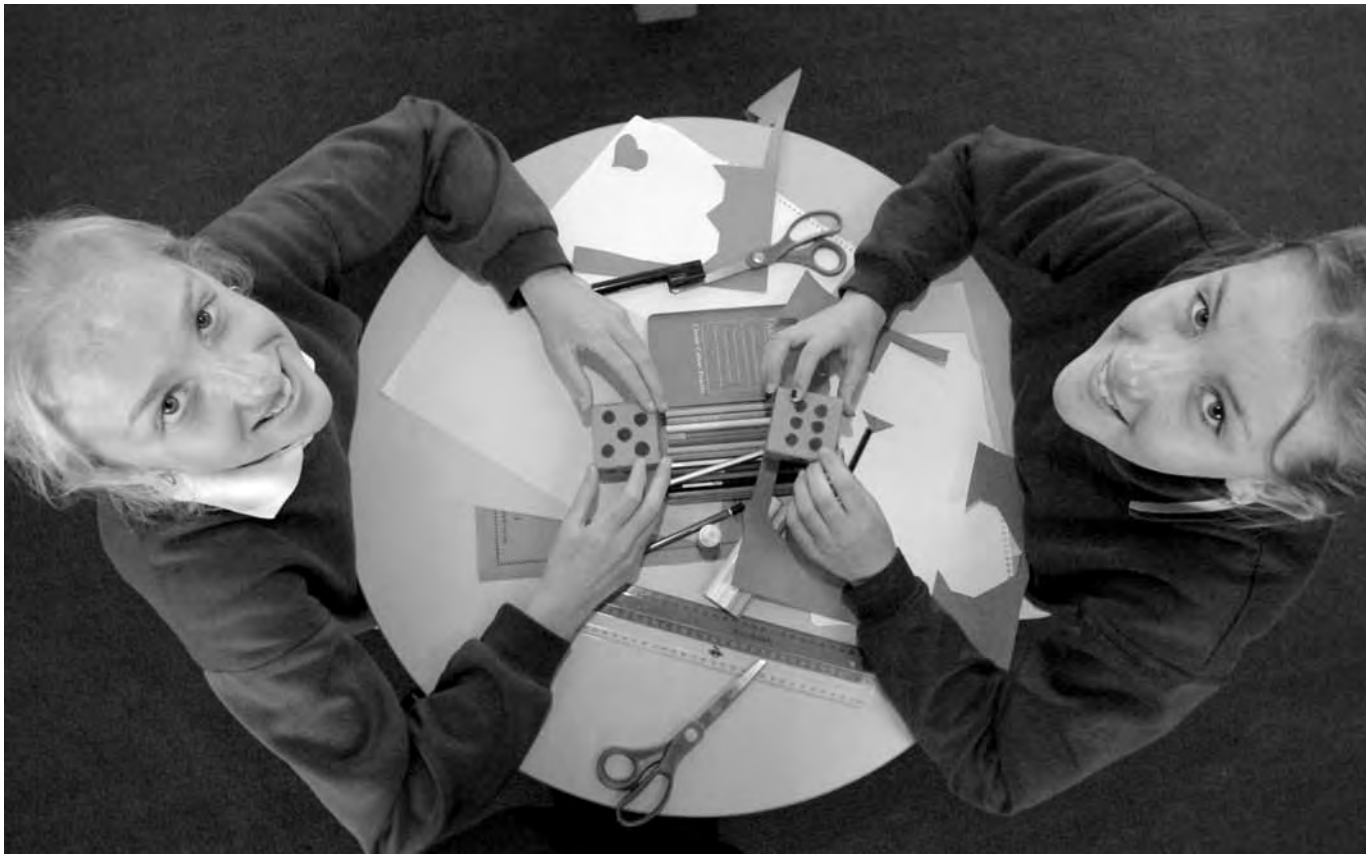
University
Course Name:
University:
Approximate UAI range:
Prerequisites:

A job or career that sounds interesting to me:

As you can see, there is more than one way to get into any career

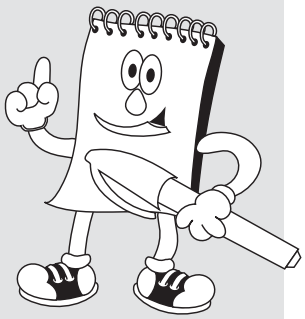
3.1.3 Jobs that need mathematics skills

Studying mathematics gives you the tools to analyse problems and think logically, which helps in whatever job or profession chosen.



Did you know?

- Workers use maths skills on the job every day to fill out time sheets, stock orders and stock control sheets, take and record measurements, complete statistical charts and graphs, calculate quantities and read formulae.
- Carpenters need to have the ability to solve mathematical problems quickly and accurately.
- Cashiers need basic mathematical skills and good manual dexterity.
- A fully skilled automotive body repairer must have good reading and basic mathematics and computer skills. Restoring automobiles to their original form requires such precision that body repairers must follow instructions and diagrams in technical manuals to make very precise three-dimensional measurements of the position of one body section relative to another.
- Employers in Australia have stated that they prize flexibility, ability to adapt, people who can "think outside the square", people who can solve problems and find new and better ways to do things.
- The compression algorithms used with MP3 music players rely heavily on mathematics. Even PlayStation 2 would be only a lump of plastic without mathematics.
- Electronic commerce (or e-commerce) would not be possible without the mathematical encryption codes that allow secure online purchases.



List some jobs where practical mathematics is needed:

Examples:

- Bricklayers and stonemasons
- Broadcast technicians
- Carpenters
- Construction and building inspectors
- Electricians
- Inspectors, testers, and graders
- Jewellers
- Laboratory technicians
- Plumbers, pipe-fitters, and steamfitters
- Sheet-metal workers
- Surveying and mapping technicians
- Truck, bus, and diesel engine specialists
- Welders and cutters

List other examples below:

- _____
- _____
- _____
- _____
- _____
- _____
- _____

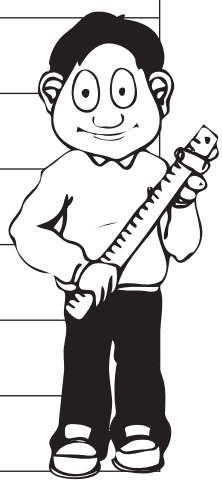
Did you know?

- In the job market, many employers consider it a bonus if mathematics is part of a degree.
- Mathematics is fundamental to the study of nearly all science subjects and a pre-requisite for the study of many others.
- The study of mathematics develops the powers of analysis, logical thinking and problem solving.
- Mathematicians are employed in a wide variety of organisations, often as part of a multi-disciplinary team.
- Mathematics graduates are employed in many areas including: business professional, clerk, mathematician or statistician, computing professional, teacher, manager, other science or engineering professional, organisations analyst, other professional, actuary.
  (Source: *Gradlink* **www.gradlink.edu.au**)
- The median starting salary for a mathematics graduate in 2003 was $38 000, which was in the top 7 starting salaries.
  (Source: *Gradlink* **www.gradlink.edu.au**)

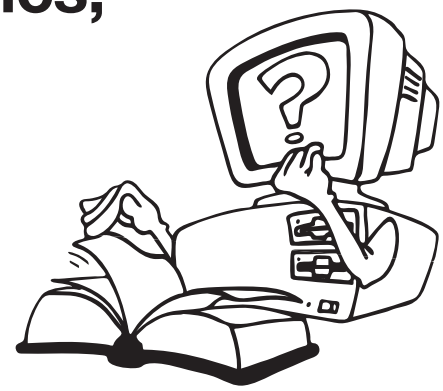
List the type of tertiary education required for the following occupations that require mathematical knowledge:

Examples include: University, TAFE, Private Provider.
For information, go to the *DEST Jobguide* or **www.myfuture.edu.au**

1. Accountant	
2. Administration Clerk	
3. Air Defence Officer	
4. Blinds Technician	
5. Book Binder	
6. Bus Driver	
7. Butcher	
8. Chemistry Tutor	
9. Cook	
10. Dental Assistant	
11. Engine Reconditioner	
12. Factory Assistant	
13. Junior Café Assistant	
14. Landscaper	
15. Mathematics Teacher	
16. Mechanic	
17. Panel Beater	
18. Pilot	
19. Plumber	
20. Printing Machinist	
21. Real Estate Valuer	
22. Receptionist	



3.1.4 Web Quest – mathematics, jobs and careers



Mathematics is used in almost everything we see and do.

Search the websites listed and then complete the tasks that follow.
All website addresses were correct at the time of development (June 2005)

http://mathcentral.uregina.ca/RR/database/RR.09.97/harding3.html

Read the three interviews with parents and answer the following questions:

1. List the occupations of the three parents chosen.

2. How did each of them use mathematics in their job?

3. Did they feel that mathematics skills were an important part of their job?

4. Did you expect that mathematics would be used in that particular job? Why?

www.torgas.com.au/jobs_online1.htm

Read the job descriptions of the jobs advertised and answer these questions:

1. List the jobs that require mathematics skills.

2. List other skills that are important to the employer.

3. List the employment related skills that are mentioned in any of the adverts.

www.maths.uq.edu.au/~infinity/profiles/grad_profiles.html

Choose and read the profiles of three of the graduates and answer the following questions:

1. List the occupations of the three graduates chosen.

2. Had they considered a career in mathematics to begin with?

3. Describe their career path.

4. Do you think their mathematics skills made them more employable? Why?

www.careersthatgo.com.au

- Click on *Teachers* from the home page.
- Click on *Teacher* Search
- Select *Mathematics* from the "Choose a CSF level"
- From the list of profiles, select three different jobs. Choose a mix of those that require training and those that require a university qualification.
- Answer these questions:

  1. List the three jobs chosen.

  2. For each job:

     i. What is the name of the person profiled?

     ii. What types of tasks are involved in their job?

www.bced.gov.bc.ca/careers/aa/lessons/math.htm

Mathematics is applied in a range of areas.

Click on *Making Plans* and answer these questions:

1. List some of the tasks an event planner is responsible for.

2. List five tasks that require the event planner to use mathematics.

3. What other skills would an event planner need to have?

Click on *Pixelmaniacs* and answer these questions:

1. What are the main tasks of a computer game designer?

2. What type of mathematics is used by games designers?

3. What employment related skills do you think are used by games designers?

4. Describe one situation that you think would involve using one of the employment related skills.

http://plus.maths.org/interview.html

Careers that involve mathematics are many and varied. Choose three profiles from this site and write a brief summary of the article which includes:

1. The job title
2. The name of the person profiled
3. A description of what the person does
4. The career path followed by the person
5. The qualifications obtained by the person

_____

_____

_____

_____

_____

_____

www.maths.unsw.edu.au
www.maths.usyd.edu.au
www.math.uow.edu.au

Go to one of the university home pages listed above and read how and where mathematics is used. Make a list of careers that interest you and what qualifications are needed for that career.

_____

_____

_____

_____

_____

_____

_____

_____

3.1.5 Time sheet mathematics

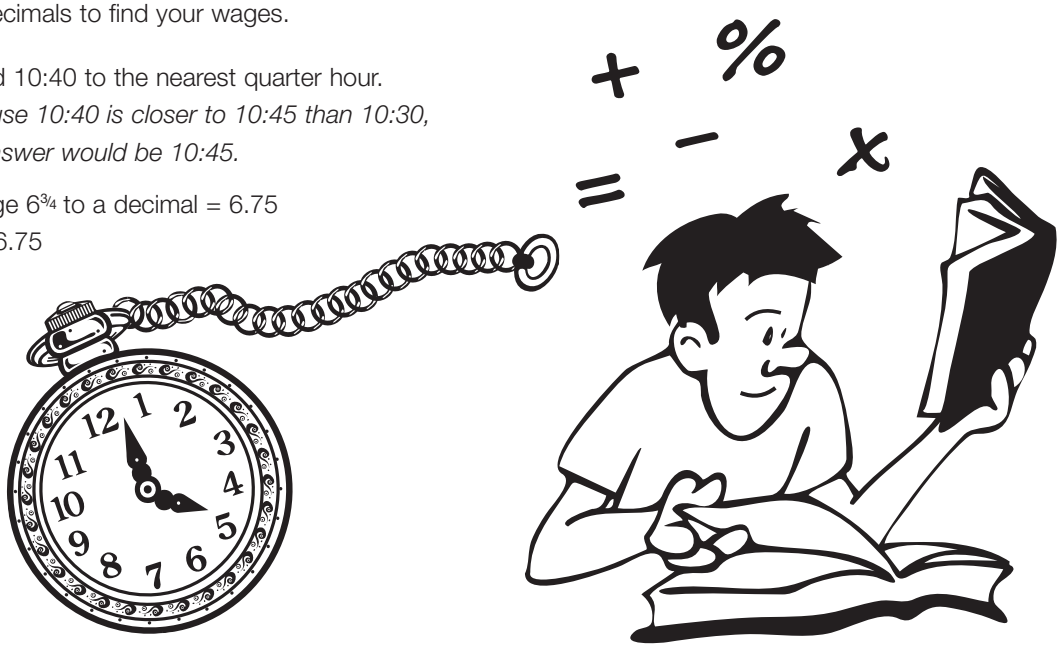
When you work for a business that pays you on an hourly basis, you are usually required to keep a time sheet.

A weekly time sheet shows the time you reported for work and the time you departed each day of the week.

The hours worked are calculated for each day. The daily hours are added to arrive at the total hours for the week. The hours worked each day must be rounded to the nearest quarter hour. It is usually easier to change those quarter hours to equivalent decimals to find your wages.

Example 1: Round 10:40 to the nearest quarter hour.
Because 10:40 is closer to 10:45 than 10:30, the answer would be 10:45.

Example 2: Change $6\frac{3}{4}$ to a decimal = 6.75
$6\frac{3}{4} = 6.75$



Round each of the following times to the nearest quarter hour. Write answers as fractions.

1. 6:44
2. 4:23
3. 9:17
4. 5:04
5. 7:35

Change each of the following to their equivalent decimal.

1. $6\frac{3}{4}$
2. $8\frac{1}{4}$
3. $6\frac{1}{2}$

1) If Lucy worked from 6:05 pm to 8:51 pm, find

a) the elapsed time

b) the elapsed time rounded to the nearest quarter hour

c) the rounded time written as a decimal

2) If Lucy worked from 6:45 pm to 11:59 pm, find

a) elapsed time

b) the elapsed time to the nearest quarter hour

c) the elapsed time written as a decimal

3) Complete the following time sheet.

EMPLOYER TIME SHEET APPLIANCE PARTS, INC.							NAME: Lucy Wallace DEPARTMENT: Parts
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Date	7/6/2005	8/6/2005	9/6/2005	10/6/2005	11/6/2005	12/6/2005	
In	7:00	7:10	6:50	6:58	7:15	7:05	
Out	11:00	11:30	11:15	10:45	11:49	12:45	
In	12:00	12:00	11:55	11:25	12:30	–	
Out	4:20	5:15	4:20	3:50	5:02	–	
Elapsed Time Hours and Minutes							**Total Hours**
Daily Total Nearest Quarter Hour							
Daily Total Decimal Equivalent							

4) Enter the information in the table into a spreadsheet and perform the following tasks:

a) Add a column to the spreadsheet and call it *Wage*.

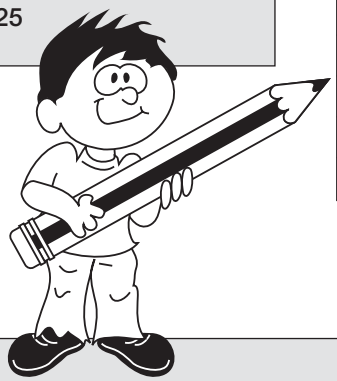
b) If Lucy earned $22.50 per hour for weekday work, calculate how much she would earn each day.
(use a formula to calculate the amount.)

c) If Lucy was paid time-and-a-half rates for weekend work, calculate her pay for Saturday.

d) Calculate Lucy's total wage for the week.

Time sheet mathematics – Answers

1. $6\frac{3}{4}$	1. **6.75**	1. a. **2 hours and 46 minutes**
2. $4\frac{1}{2}$	2. **8.25**	b. $2\frac{3}{4}$
3. $9\frac{1}{4}$	3. **6.5**	c. **2.75**
4. **5**		2. a. **5 hours and 14 minutes**
5. $5\frac{1}{2}$		b. $5\frac{1}{4}$
		c. **5.25**



EMPLOYER TIME CARD APPLIANCE PARTS, INC.		NAME: Lucy Wallace DEPARTMENT: Parts	
Day	**Elapsed Time Hours and Minutes**	**Daily Total Nearest Quarter Hour**	**Daily Total Decimal Equivalent**
Monday	8hr, 20min	$8\frac{1}{4}$	8.25
Tuesday	9hr, 35min	$9\frac{1}{2}$	9.5
Wednesday	8hr, 50min	$8\frac{3}{4}$	8.75
Thursday	8hr, 12min	$8\frac{1}{4}$	8.25
Friday	9hr, 6min	9	9
Saturday	5hr, 40min	$5\frac{3}{4}$	5.75
	Total Hours	$49\frac{1}{2}$	49.5

EMPLOYER TIME SHEET APPLIANCE PARTS, INC.						NAME: Lucy Wallace DEPARTMENT: Parts
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Date	7/6/2005	8/6/2005	9/6/2005	10/6/2005	11/6/2005	12/6/2005	
In	7:00	7:10	6:50	6:58	7:15	7:05	
Out	11:00	11:30	11:15	10:45	11:49	12:45	
In	12:00	12:00	11:55	11:25	12:30	–	
Out	4:20	5:15	4:20	3:50	5:02	–	
Elapsed Time Hours and Minutes							**Total Hours**
Daily Total Nearest Quarter Hour	$8\frac{1}{4}$	$9\frac{1}{2}$	$8\frac{3}{4}$	$8\frac{1}{4}$	9	$5\frac{3}{4}$	
Daily Total Decimal Equivalent	8.25	9.5	8.75	8.25	9	5.75	49.5
Wage	$185.63	$213.75	$196.88	$185.63	$202.50	$129.38	$1,113.75

3.2 Mathematics teaching unit: Consumer Arithmetic – Simple interest versus compound interest

Australian Government
Quality Teacher Programme

Note: This unit of work has been adapted from the unit of work produced by Mark Fletcher at Wagga Wagga High School, as part of the Australian Government Quality Teacher Programme Vocational Learning Project in 2003.

UNIT TITLE: Consumer Arithmetic – Simple interest versus compound interest	
SYLLABUS REFERENCE: NS5.1.2 Solves consumer arithmetic problems involving earning and spending money. NS5.2.2 Solves consumer arithmetic problems involving compound interest, depreciation and successive discounts.	**UNIT OVERVIEW:** Students participate in a series of activities investigating simple interest and compound interest. At the conclusion of the unit students will be able to compare and contrast simple interest and compound interest and understand the relevance of each in our community.
STAGE: 5 **YEAR GROUP: 10**	
UNIT OUTCOMES: Students will: • understand and apply simple interest and compound interest formulae • perform simple interest and compound interest calculations and apply to real-life situations including, loans, investments, savings, superannuation, appreciation and depreciation • experience the three dimensions of pedagogy related to quality teaching • demonstrate employment related skills • achieve the cross-curriculum content outcomes related to Work, Employment and Enterprise • develop confidence and appreciation of mathematics by engaging in a curriculum that has relevance.	

3. Student Vocational Learning Activities

Activity	Content Overview	Employment Related Skills
1 **Simple interest**	• Define simple interest • How do we calculate simple interest (formula)? • Describe the pronumerals in the simple interest formula $I = (prn)/100$ • Complete exercises on calculating simple interest, interest rates, time periods and the principal • Complete exercises on calculating simple interest multiple times.	• Learning • Communication • Problem solving
2 **Simple interest in the community**	• Collect three examples of simple interest in magazines and newspapers • Explain each example in detail • List as many areas as you can find where simple interest is used • Predict problems that may arise when calculating simple interest.	• Learning • Communication • Planning and organising
3 **Compound interest**	• Define compound interest • How do we calculate compound interest (formula)? • Describe the pronumerals in the compound interest formula $A = p(1+r/100)^n$ • Complete exercises on calculating compound interest, interest rate, time periods, principal and the amount (new balance).	• Learning • Problem solving
4 **Compound interest in the community**	• Find three examples of compound interest in magazines and newspapers • Explain each example in detail • List as many areas as you can find where compound interest is used • Predict problems that may arise when calculating compound interest • Use Internet sites to find commercial rates (variable and fixed) for home loans, savings account interest rates, term investments • Use a 'home loan calculator' (found on banking websites).	• Learning • Communication • Technology • Planning and organising
5 **Simple and compound interest**	• Compare and contrast simple and compound interest • Create a list of where each type of interest is used • Recommend when it is best to use simple interest • Recommend when it is best to use compound interest.	• Learning • Communication • Problem solving

Activity 1 – *Simple interest*

Outcomes:

By the end of this activity students should be able to:

- Explain the concept known as simple interest
- Determine a simple interest calculation
- Change the subject of the equation to determine the value of other variables.

Prerequisites:

To begin this activity students need proficiency at:

- Changing a percentage to a decimal
- Rearranging the subject of an equation
- Using a calculator when multiplying
- Rounding off to two decimal places when dealing with money
- Creating a recount to explain understanding.

Key Quality Teaching Elements:

- Metalanguage
- Engagement
- Background knowledge

Resources:

A range of reference books which outline varying explanations, examples and question types.

Student Activity:

Answer the following questions:

- What is simple interest? How do we calculate it? And what else can be deduced from the formula?
- Explain each of the pronumerals used within the formula

  (Hint: Pretend that you are writing this explanation for another person that has no idea about formula and needs assistance in understanding it. Think of 'changing the subject' of an equation.)
- Complete exercises on calculating simple interest and other variables
- Complete exercises on calculating simple interest multiple times.

Assessment/Evaluation:

At the conclusion students who have mastered this activity should be able to explain verbally and with the aid of examples the concept of simple interest.

Activity 2 – *Simple interest in the community*

Outcomes:

By the end of this unit students should be able to:

- Give practical examples of where simple interest is used in the community
- Recognise the advantages/disadvantages of simple interest
- Appreciate the relevance of simple interest.

Prerequisites:

To begin this activity students need proficiency at:

- Collecting, organising and analysing information
- Listening to others
- Communicating ideas and information.

Key Quality Teaching Elements:

- Problematic knowledge
- Substantive knowledge
- High expectations
- Connectedness

Resources:

The following is a recommended list of resources to successfully complete this activity (it may be complemented depending on student and school dynamics):

- A range of different reference books for access to varying question types
- Newspapers and magazines

- Local experts in the financial field, local bank manager, teacher of commerce, parents etc
- Internet access.

Student Activity:

- Explain how, why and where simple interest is used? Collect three examples from the media where simple interest is used
- Brainstorm with others the areas in which simple interest is used. Record your ideas
- Research and record situations in which simple interest is used. Think of the practical applications of simple interest, use the internet, library, local business, banks etc.
- Predict problems that may arise when calculating simple interest.

Assessment/Evaluation:

At the conclusion students who have mastered this activity should recognise the relevance of simple interest in the community and appropriate times when it is used. They should be able to apply their new knowledge to solve various real-life problems identifying the advantages and disadvantages of simple interest.

Activity 3 – *Compound interest*

Outcomes:

By the end of this unit students should be able to:

- Describe what compound interest is
- Use the compound interest formula to solve simple problems
- Change the subject of the equation to determine the value of other variables.

Prerequisites:

To begin this activity students need proficiency at:

- Changing a percentage to a decimal
- Rearranging the subject of an equation
- Using a calculator when using powers etc
- Rounding off to two decimal places when dealing with money
- Creating a recount to explain understanding.

Key Quality Teaching Elements:

- Metalanguage
- Deep knowledge
- Background knowledge
- High expectations

Resources:

A range of reference books which outline varying explanations, examples and question types.

Student Activity:

- Explain compound interest? (A formal definition in your own words)
- What is the formula to calculate it?
- What else can be deduced from the formula?
- Explain each of the pronumerals used within the formula

  (Hint: Pretend that you are writing this explanation for another person that has no idea about formula and needs assistance in understanding it. Think of 'changing the subject' of an equation.)
- Complete exercises on calculating compound interest and other variables.

Assessment/Evaluation:

At the conclusion students who have completed this activity should be able to explain verbally and with the aid of examples the formula for calculating compound interest problems.

Activity 4 – *Compound interest in the community*

Outcomes:

By the end of this unit students should be able to:

- Give practical examples of where compound interest is used in the community
- Recognise the advantages/disadvantages of compound interest
- Appreciate the relevance of compound interest.

Prerequisites:

To begin this activity students need proficiency at:

- Collecting, organising and analysing information
- Listening to others
- Communicating ideas and information.

Key Quality Teaching Elements:

- Deep understanding
- Engagement
- Connectedness
- Narrative

Resources:

The following is a recommended list of resources to successfully complete this activity. (It may be complemented depending on student and school dynamics):

- Local experts in the financial field, local bank manager, teacher of commerce, parents etc.
- Internet access, newspapers and magazines.

Student Activity:

- Explain how, why and where compound interest is used? Collect three examples from the media where compound interest is used
- Brainstorm with others the areas in which compound interest is used. Record your ideas
- Research and record situations in which compound interest is used. Think of the practical applications of compound interest, use the internet, library, local business, banks etc.
- Predict problems that may arise when calculating compound interest
- Use the Internet to access commercial bank websites. Find different rates on home loans (fixed and variable), savings accounts and term investments. Identify and give examples (print)
- Use loan calculators (on commercial bank websites) to calculate interest on different amounts/rates. Identify and give examples (print).

Assessment/Evaluation:

At the conclusion students who have mastered this activity should recognise the relevance of compound interest in the community and appropriate times when it is used. They should be able to apply their new knowledge to solve various real-life problems identifying the advantages and disadvantages of compound interest.

Activity 5 – *Simple and compound interest*

Outcomes:

By the end of this activity students should be able to:

- Compare and contrast simple interest and compound interest
- Recommend situations where each is best used.

Prerequisites:

To begin this activity students need proficiency at:

- Calculating simple and compound interest
- Using a calculator when multiplying
- Rounding off to two decimal places when dealing with money
- Creating a recount to explain understanding.

Key Quality Teaching Elements:

- Higher order thinking
- Deep understanding
- Engagement
- Background knowledge
- Connectedness

Resources:

The following is a recommended list of resources to successfully complete this activity. (It may be complemented depending on student and school dynamics):

- A range of reference books for access to varying explanations, examples and question types.

Activity 5 – *Simple and compound interest (continued)*

Student Activity:

Compare and contrast simple interest and compound interest by completing the following question. A calculator may be of assistance here. Make sure to round off correctly to the nearest cent.

Question

Madeline makes a one-off investment of $2000 into a bank account. The bank manager informs Madeline that the account is compounded monthly at 6% p.a. If Madeline desires to invest her money for nine months, use the compound formula below and complete the table to verify the amount calculated.

Part 1: Using the compound interest formula

Use the compound interest formula here to calculate the interest and original amount for the above problem. Once completed, complete the table below and compare your results

Part 2: Using the simple interest formula multiple times

BE CAREFUL TO CORRECTLY ROUND-OFF TO THE NEAREST CENT EACH TIME.

Number of months	Interest	Amount
0		$2000.00
1	$2000 x $^{6/12}/_{100}$ x 1 = $10	$2000 + $10 = $2010
2	$2010 x $^{6/12}/_{100}$ x 1 = $10.05	$2010 + $10.05 = $2020.05
3		
4		$2040.30
5		
6	$10.25	
7		
8	$10.36	
9		

Once this table is complete, if there are no errors, the final answer in the last column should be the same answer as that calculated in Part 1.

- Create a table that summarises where simple interest and compound interest is used
- Recommend when it is best to use simple interest
- Recommend when it is best to use compound interest.

Assessment/Evaluation:

At the conclusion students who have mastered this activity should recognise the relevance of simple and compound interest in the community and be able to apply their new knowledge to solve various real-life problems. Students should be able to compare and contrast simple and compound interest, by providing reasoned arguments and recommend situations where each is best used.

4. Education and Training Pathways in Mathematics

4.1 Credit transfer arrangements

Credit transfer is the granting of advanced standing by institutions (either in the same or a different sector to the original institution) to students on the basis of previous study undertaken in another institution.

4.1.1 Credit transfer arrangements: HSC to TAFE NSW

Credit transfer arrangements negotiated between the NSW Board of Studies and TAFE NSW allows credit for study completed as part of the HSC.

To be eligible for credit transfer in a TAFE NSW course, students need to provide appropriate evidence of previous study or experiences at the time of enrolment. Credit is awarded depending on whether study and experience is relevant to a student's chosen TAFE NSW course.

Successful students will receive advanced standing into their chosen TAFE NSW course and complete fewer modules/units making it possible to achieve a TAFE NSW qualification faster.

Credit transfer does NOT give automatic entry into a TAFE NSW course.

Further information about credit transfer for HSC courses can be found at: **www.det.nsw.edu.au/hsctafe/new**

Note: VET Industry Curriculum Framework Courses (ICFs) are based on units of competency. Students who study VET ICFs need to speak with TAFE NSW enrolling officers for information about the amount of module credit available.

4.1.2 HSC Mathematics courses and credit transfer arrangements

Students who successfully complete the Mathematics courses listed below, and who meet the conditions for credit transfer are eligible to receive credit for specified modules/units in some TAFE NSW courses.

It is recommended that teachers check the website **www.det.nsw.edu.au/hsctafe** regularly as changes to courses and credit transfer arrangements between the HSC and TAFE NSW may occur.

The following information is correct at the time of publication (June 2005).

Mathematics Extension 1 [Band 3 or higher] has credit transfer arrangements with the following TAFE NSW courses

- Aboriginal Studies
- Computer Systems Technology
- Detail Drafting
- Drafting Trades
- Electrical Engineering
- Electrical Engineering (Computer Systems)
- Electrical Engineering (Electronics and Communications)
- Electrical Engineering (Industrial Control)
- Electrical Engineering (Industrial Electronics)
- Electrical Technology
- Electronics – Trade
- Electronics Technology
- Engineering – Technician
- General and Vocational Education (CGVE)
- H.V.A.C – Refrigeration Engineering
- Introduction to Tertiary Preparation
- Manufacturing Technology
- Mechanical and Manufacturing Engineering
- Mechanical Engineering
- Mechanical Technology
- Naval Architecture
- Naval Architecture Technology
- Photonics
- Preparatory Mathematics and Science

List continues overleaf.

- Telecommunications Engineering
- Tertiary Preparation
- Vocational Preparation.

Mathematics [Band 2 or higher] has credit transfer arrangements with the following TAFE NSW courses

- Aboriginal Education Assistants
- Aboriginal Studies
- Foundation and Vocational Education
- Introduction to Tertiary Preparation
- Preparatory Mathematics and Science
- Tertiary Preparation
- Vocational Preparation.

Mathematics [Band 3 or higher] has credit transfer arrangements with the following TAFE NSW courses

- Aboriginal Studies
- Access to Work and Educational Opportunities
- Career Education and Employment for Women (CEEW)
- Computer Systems Technology
- Detail Drafting
- Drafting Trades
- Electrical Engineering
- Electrical Engineering (Computer Systems)
- Electrical Engineering (Electronics and Communications)
- Electrical Engineering (Industrial Control)
- Electrical Engineering (Industrial Electronics)
- Electrical Technology
- Electronics – Trade
- Electronics Technology
- Electrotechnology Communications
- Electrotechnology Entertainment and Servicing
- Engineering – Technician
- Electrotechnology Computer Systems
- Foundation and Vocational Education
- General and Vocational Education (CGVE)
- H.V.A.C – Refrigeration Engineering
- Introduction to Tertiary Preparation
- Manufacturing Technology
- Mechanical and Manufacturing Engineering
- Mechanical Engineering
- Mechanical Technology
- Naval Architecture
- Naval Architecture Technology
- Photonics
- Preparatory Mathematics and Science
- Telecommunications Engineering
- Tertiary Preparation
- Vocational Preparation
- Work Skills.

Mathematics [Band 4 or higher] has credit transfer arrangements with the following TAFE NSW courses

- Aboriginal Studies
- Computer Systems Technology
- Detail Drafting
- Drafting Trades
- Electrical Engineering
- Electrical Engineering (Computer Systems)
- Electrical Engineering (Electronics and Communications)
- Electrical Engineering (Industrial Control)
- Electrical Engineering (Industrial Electronics)
- Electrical Technology
- Electronics – Trade
- Electronics Technology
- Engineering – Technician
- H.V.A.C – Refrigeration Engineering
- Manufacturing Technology
- Mechanical and Manufacturing Engineering
- Mechanical Engineering
- Mechanical Technology
- Naval Architecture
- Naval Architecture Technology
- Photonics
- Preparatory Mathematics and Science
- Telecommunications Engineering

- Tertiary Preparation
- Vocational Preparation.

Mathematics [Band 5 or higher] has credit transfer arrangements with the following TAFE NSW courses

- Computer Systems Technology
- Drafting Trades
- Electrical Engineering
- Electrical Engineering (Computer Systems)
- Electrical Engineering (Electronics and Communications)
- Electrical Engineering (Industrial Control)
- Electrical Engineering (Industrial Electronics)
- Electrical Technology
- Electronics Technology
- H.V.A.C – Refrigeration Engineering
- Manufacturing Technology
- Mechanical and Manufacturing Engineering
- Mechanical Engineering
- Mechanical Technology
- Naval Architecture
- Naval Architecture Technology.

4.1.3 Credit transfer from TAFE NSW to university

Students who complete a TAFE NSW diploma or advanced diploma course can apply for an undergraduate university course and may receive credit for subjects in that university course. This may allow students to complete their degree sooner.

Universities have different entry requirements for each course. Entry requirements can vary between universities and between courses. Applicants are considered on a case by case basis. Students should contact the university they want to enter for information about specific arrangements.

Further information on credit agreements between TAFE NSW and universities and course information can be found at:

www.sit.nsw.edu.au/courses

www.avcc.edu.au
(Policies and Programs/Teaching and Learning/Credit Transfer/Links with VET)

Note: Students should contact the relevant TAFE NSW institution for credit arrangements with universities and also check the university faculty/school handbook and website for current arrangements and requirements.

Listed below are ***some examples of credit arrangements.*** They are a ***guide only*** to help teachers and students understand pathway planning options.

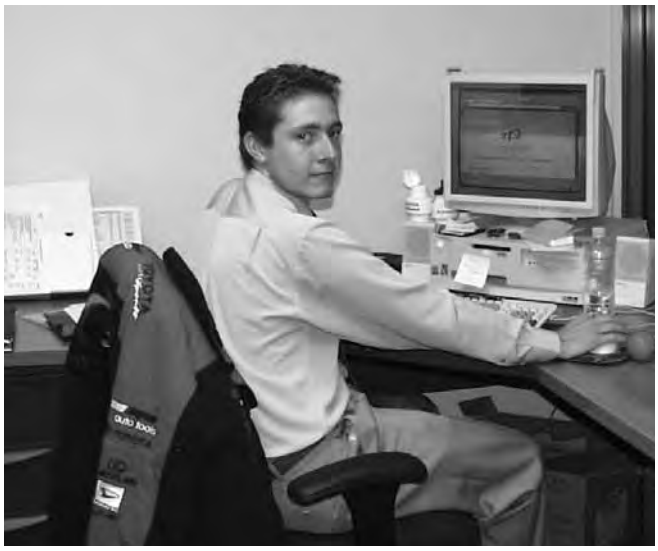
TAFE NSW Course (Sydney Institute)	University	Degree Course	Credit Arrangement
Diploma in Business (Banking and Finance)	New England	Bachelor of Administrative Leadership	Block credit: 1 year of 3-year degree
		Bachelor of Professional Studies	Block credit: 1 year of 3-year degree
		Bachelor of Commerce	Up to 12 subjects (8 subjects are equivalent to 1 full of study)
		Bachelor of Financial Administration	Up to 12 subjects (8 subjects are equivalent to 1 full year of study)
Diploma in Information Technology (Software Development)	Australian Catholic – ACU National	Bachelor of Information Systems	120 credit points (degree requires 240 credit points to complete)

4.2 Traineeships and apprenticeships

Traineeships and apprenticeships are jobs that combine paid work with formal training in a specific industry/occupation.

Apprenticeships and traineeships are available in most industries including:

- Arts and Entertainment
- Automotive
- Building and Construction
- Community Services and Health
- Communications
- Finance, Insurance and Business Services
- Food Industry
- Forest Industries
- Furnishing, Light Manufacturing, Textiles, Clothing and Footwear
- Manufacturing and Engineering
- Mining
- Primary Industries
- Process Manufacturing
- Public Sector
- Retail and Wholesale
- Sport and Recreation
- Tourism and Hospitality
- Transport and Distribution
- Utilities and Electrotechnology.



Apprenticeships generally last four years and cover traditional trade areas including aircraft, automotive, boat building, bricklaying, cookery, drafting, electrical, electronic, floor covering, green keeping, hairdressing, plumbing, saddlery, sign writing, stone masonry and wood machining. There are more than 100 apprenticeship vocations available in NSW.

Traineeships are offered in over 600 vocations and have been introduced to provide employment and training opportunities in a broader range of industry areas. Traineeships are shorter than apprenticeships, usually 12 months fulltime.

Examples of traineeships that may be of interest to students of Mathematics include:

Finance, **Insurance and Business Services:** Advertising, E-Business, Human Resources, Small Business Management, Credit Management and Mercantile Agents.

Automotive: Automotive Manufacturing, Heavy Vehicle Brakes, Mechanical – Air Conditioning, Vehicle Body – Detailing, Outdoor Power Equipment (Services).

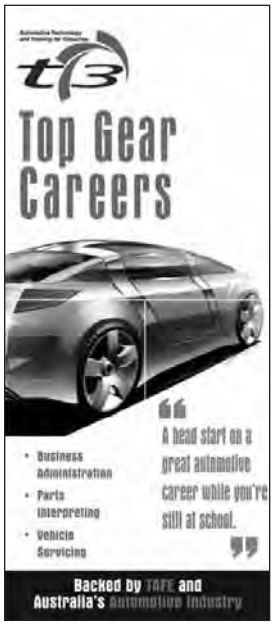
Building and Construction: Bridge/Marine Construction, Tunnel Construction, Road Construction and Maintenance.

Manufacturing Engineering: Aeroskills – Avionics, Boating Services, Engineering Production.

Communications: Information Technology – Business, Client Support, Database Administration, Helpdesk, Multimedia Integration, Multimedia, Network Administration, Network Engineering, Programming, Software Applications, Software Development, Systems Administration, Systems Analysis and Design, Technical Support, Telecommunications.

Retail and Wholesale: Retail Management, Retail Operations – Buying and Marketing, Customer Service, Store Operations, Retail Supervision, Wholesale Services.

4.2.1 School Based Traineeships in NSW schools



School Based Traineeships provide students with increased opportunities to gain experience and qualifications in a particular industry while still at school.

Students are able to include a recognised VET qualification within their HSC and combine this with paid work.

Students successfully completing a School Based Traineeship receive:

- a nationally recognised VET qualification under the Australian Qualifications Framework
- Certificate of Proficiency
- credit toward the Higher School Certificate.

Generally, during Year 11 and 12, students spend the equivalent of three and a half days a week on their HSC program at school, one day a week in paid employment with their employer and a half day a week undertaking structured training either at school, TAFE or another registered training organisation.

- More information about current NSW traineeships and apprenticeships and School Based Traineeships in NSW schools can be found at the following website: **http://apprenticeship.det.nsw.edu.au/html/schavatrains.htm**
- The Commonwealth Government refers to all traineeships and apprenticeships as new apprenticeships. More information about new apprenticeships can be found at: **www.newapprenticeships.gov.au**
- Further information on School Based Traineeships is available from the Vocational Education in Schools Directorate website: **www.det.nsw.edu.au/vetinschools**

Over 50 traineeships are available for the School Based Traineeship Program. Industry areas include:

- Aeroskills
- Automotive
  (T3 – Vehicle Servicing, Parts and Accessories and Business)
- Business
- Electrotechnology
- Engineering
- Information Technology
- Retail (McDonald's and Big W)
- Property.

5. Vocational and Enterprise Learning Resources

5.1 Employment related skills and their elements

The employment related skills are as important as job-specific or technical skills. They are generic transferable skills. Students' development of these skills is integral to their ability to fulfil a successful life that incorporates education, work, relationships and recreational pursuits. The elements are the facets of the skills that will help teachers identify when students are demonstrating these skills. The depth and level at which students may demonstrate these skills will vary depending on the expectations of the activities undertaken and the age and experience of the student.

Employment Related Skills	Elements
Self-management – ability to take responsibility for setting and achieving personal goals	***Evidence of self-management can include a range of the following …*** • Setting goals and priorities that balance work and personal life • Monitoring and evaluating performance regarding personal goals • Building and maintaining a positive self-image to enhance confidence • Developing an eye for detail and being precise • Managing change by being flexible, open and responsive • Being proactive in career planning, time management and setting challenges • Managing various aspects of work and personal life, including health and fitness • Learning from mistakes and accepting feedback for continual improvement • Seeking out advice and support when required • Presenting in a manner suitable to the occasion • Developing competence in managing interpersonal and emotional relationships • Understanding, and being able to use, varying means for managing stress and conflict • Understanding the importance of managing time, and having preferred techniques for doing so • Understanding the importance of celebrating success and managing disappointment, and ways of handling these • Matching personal goals and capabilities to an undertaking • Knowing how to deal appropriately with persons in authority • Keeping a focus on the task and outcomes required • Dealing with people, problems and situations with honesty, integrity and personal ethics • Showing interest, initiative and effort • Being socially responsible and contributing to the community • Understanding the importance of reflecting and applying critical judgement • Carrying through an agreed responsibility • Accepting and providing feedback in a constructive and considerate manner.

Employment Related Skills	Elements
Initiative and enterprise – ability to seek/take advantage of opportunities	***Evidence of initiative and enterprise can include a range of the following …*** • Developing a strategic, creative, long term vision and actioning it • Identifying opportunities not obvious to others • Showing independence and initiative in identifying problems, generating a range of options and initiating innovative solutions • Exploring beyond existing boundaries to identify implications and learn from others • Understanding how society, government and business work, and the importance of active citizenship • Understanding what is meant by being enterprising, entrepreneurial and how to develop capacities for these • Understanding how to demonstrate initiative • Ability to manage risk and uncertainty • Willing to take risks and learn from mistakes.
Learning – ability to achieve new skills and/or knowledge	***Evidence of learning can include a range of the following …*** • Willingness to continuously learn and grow in a range of settings, taking into account preferred learning styles • Understanding one's own preferred learning style and working to develop other learning styles • Identifying and accessing learning sources and opportunities • Investing time and effort to acquire new knowledge and technology skills • Assessing personal strengths and areas for development • Exploring and understanding personal creative talents and how to make best use of them • Demonstrating personal and career oriented learning plans • Setting, managing and achieving learning goals • Using a range of mediums to learn – mentoring, peer support, networking, information technology (IT) • Being open to new ideas and techniques • Acknowledging the need to learn in order to accommodate change and build career paths • Being a member of and contributing to a learning community • Understanding the importance of learning new skills and acquiring new knowledge throughout life.

Employment Related Skills	Elements
Communication – ability to express and understand information	***Evidence of communication skills can include a range of the following …*** • Listening effectively and asking questions to understand and appreciate the points of view of others • Writing and speaking clearly, concisely, coherently and directly so others pay attention and understand • Reading and understanding information presented in a variety of forms (eg words, graphs, charts, diagrams) • Recognising the purpose of the communication and the needs of the audience • Sharing ideas and information using a range of information and communication technologies • Using relevant scientific, technical and mathematical knowledge and skills to explain or clarify ideas • Observing and recording data using appropriate methods, tools and technology • Having confidence in personal ideas and vision and being able to articulate these • Speaking and writing in languages other than English • Appreciating and understanding the role of non-verbal communication • Persuading and influencing others by inspiration, sensitivity and clarity • Establishing and using networks, both formal and informal.
Teamwork – ability to work effectively with others to get things done	**Evidence of teamwork can include a range of the following …** • Working as an individual and developing a rapport with others to form working relationships • Recognising and respecting the diversity, individual differences and perspectives of others • Understanding how to operate in a team • Understanding personal capacity for filling different team roles • Identifying the strengths of team members • Understanding how to assist others (eg coaching, mentoring and giving feedback) • Ensuring that the team's purpose and objectives are clear and establishing consensus on individual roles and responsibilities • Influencing, negotiating, collaborating, supervising, directing and motivating others to achieve a recognised objective (demonstrating leadership) • Managing and resolving conflict when appropriate and recognising the role of conflict in a group to identify issues and reach solutions • Understanding how to relate to other people in varying contexts, including those where they manage or are managed by others; and how to get things done • Respecting and being open to and supportive of the thoughts, opinions and contributions of others in a group.

Employment Related Skills	Elements
Planning and organising – ability to coordinate and prioritise tasks and resources	***Evidence of planning and organising can include a range of the following …*** • Developing a vision and a flexible pro-active plan to achieve it • Managing time and priorities – setting timelines, coordinating tasks for self and with others • Allocating people and appropriate tools and technology to tasks or a project • Being resourceful • Developing a range of techniques to locate, gather, assess and organise information using appropriate technology and information systems • Adapting resource allocations to cope with unexpected circumstances • Establishing clear project goals, deliverables and contingencies • Taking initiative and making decisions • Predicting – weighing up risk, evaluating alternatives and applying evaluation criteria • Collecting, analysing and organising information, using appropriate methods, tools and technology • Varying and adjusting one's approach or style according to situation demands • Making estimates and verifying calculations • Participating in continuous improvement and planning processes (monitoring and evaluating) • Evaluating the process and the product.
Problem solving – ability to identify problems and develop solutions	***Evidence of problem solving can include a range of the following …*** • Anticipating, identifying, clarifying and framing problems • Identifying the root cause/s of a problem • Developing and exploring practical solutions • Using mathematics including budgeting and financial management to solve problems • Testing assumptions taking the context of data and circumstances into account • Analysing and assessing information and situations quickly • Generating and using creative ideas and processes • Applying risk management • Seeking different points of view and evaluating them • Recognising the various dimensions of a problem (eg social, interpersonal, technical and environmental) • Deciding what needs to be measured or calculated • Readily using science, technology and mathematics as ways to think, gain and share knowledge, solve problems and make decisions • Evaluating solutions to make recommendations or decisions • Implementing solutions, then monitoring and evaluating • Maintaining an open mind.

Employment Related Skills	Elements
Technology – ability to use appropriate technologies to complete tasks	***Evidence of technology skills can include a range of the following …*** • Managing and using technology for a purpose in a given context • Having a range of basic information technology skills • Using information technology to manage and organise data • Applying occupational health and safety knowledge and practice to the use of technology • Displaying manual dexterity/fine motor skills when using technology • Applying technology to achieve work and leisure solutions • Achieving competence in handling information and communications technology and understanding the underlying processes • Understanding the social and ethical implications of technology and critically evaluating them • Being aware of technical challenges and constraints and having a plan for solving them • Understanding the role of technology in leisure and work • Understanding the implications of technology for productivity and business competitiveness.
Cross-cultural understanding – ability to respect diversity and act without discrimination	***Evidence of cross-cultural understanding can include a range of the following …*** • Recognising, valuing and respecting cultural, religious, linguistic and community diversity in local, national and global contexts • Identifying opportunities to use diversity to achieve agreed outcomes • Working effectively with people of diverse cultural, religious and linguistic backgrounds • Demonstrating an appreciation of the rights and responsibilities of individuals, groups and organisations within local, national and global contexts • Identifying how individuals and groups are interdependent on each other • Demonstrating sensitivity when interacting with individuals and groups from diverse cultural, religious and linguistic backgrounds • Working with others to achieve common goals which reflect equity and social justice • Recognising Australia's Indigenous heritage and its political, social, economic and cultural relevance • Identifying and overcoming stereotypes in life and work.

Personal attributes Personal attributes contribute to overall employability. They are a set of non-skill-based behaviours, attitudes and characteristics that contribute to a person's ability to achieve a successful life.	**Enterprise Education Learning Framework**	
	Key Qualities The enterprising learner is …	**Enterprising Characteristics** The enterprising learner …
• **Loyalty** • **Commitment** • **Honesty and integrity** • **Empathy** • **Assertiveness** • **Trust** • **Enthusiasm** • **Reliability** • **Personal presentation** • **Common sense** • **Positive self-esteem** • **A sense of humour** • **A balanced attitude to work and home life** • **An ability to deal with pressure** • **Motivation** • **Adaptability** • **Flexibility** • **Resilience** • **Determination** • **Self-reliance** • **Flexibility** • **Engagement** • **Connectedness**	**Connected**	• takes action that links learning to the real-world • communicates effectively • participates in the community.
	Engaged	• makes a head and heart contribution • is task oriented and outcomes focused • applies understanding to move forward • manages resources and time effectively.
	Resilient	• takes advantage of opportunities • actively monitors and responds to feedback • maximises capability and responds appropriately to setbacks.
	Responsible	• takes responsibility for own actions • has a sense of self-worth and belonging.
	Ethical	• contributes to the development of community values • acts in accordance with agreed values.

5.1.1 Employment related skills mapping

The table below maps the employment related skills (2005) against the employment related skills used in the *Employment Related Skills Logbook* (2002-2004) and the *Key Competencies* addressed in all NSW syllabuses.

NSW Employment Related Skills for Years 9-12 (2005)	Previous NSW ERS for Years 9 & 10	Previous NSW ERS for Prelim & HSC	Mayer Key Competencies
Communication *Ability to express and understand information*	Communication	Communicating ideas and information Negotiating and influencing	Communicate ideas and information Using mathematical ideas and techniques
Planning and organising *Ability to coordinate and prioritise tasks and resources*		Planning and organising Collecting, organising and analysing information Recruiting and managing resources	Planning and organising activities Collecting, analysing and organising information Identifying, assessing and managing risks
Teamwork *Ability to work effectively with others to get things done*	Leadership	Working with others and in teams	Working with others and in teams
Technology *Ability to use appropriate technologies to complete tasks*	Technological Physical		Using technology
Problem solving *Ability to identify problems and develop solutions*	Numerical	Solving problems	Solving problems
Learning *Ability to achieve new skills and/or knowledge*			
Self-management *Ability to take responsibility for setting and achieving personal goals*	Social	Matching personal goals and capacities to undertakings Monitoring and evaluating Being flexible and dealing with change	
Initiative and enterprise *Ability to seek/take advantage of opportunities*	Creative Practical	Using initiative and drive Generating and using creative ideas and processes Generating, identifying and assessing opportunities	
Cross-cultural understanding *Ability to respect diversity and act without discrimination*			Cultural understanding

5.2 Vocational learning resources for teachers and students

The following resources may be helpful to teachers and students who research careers and courses. Teachers and students may collect and add additional resources to this list.

Handbooks

- The most recent NSW DEST Job Guide **www.jobguide.dest.gov.au**
- The most recent version of the NSW UAC Guide **www.uac.edu.au**
- The most recent version of the TAFE NSW HANDBOOK **www.tafensw.edu.au**
- The most recent version of the HSC/TAFE Credit Transfer Guide **www.det.nsw.edu.au/hsctafe**
- The careers section of the most recent local/state newspaper.

Note: Schools located near other states should explore interstate handbooks.

Booklets

- *Aboriginal Career Aspirations Program*, Board of Studies. Distributed to schools 2002
- *Making Choices* (Work Sheets and CD-ROM) Career Education Association of WA.

Multimedia

Resource Title	Description
Logging The Real Game in NSW Schools – CD-ROM	This CD-ROM has been developed for teachers to help students identify and record their employment related skills acquired through participation in *The Real Game.* This is achieved by connecting *The Real Game* with the *School to Work Employment Related Skills Logbook* and shows how these two resources complement each other. *Logging The Real Game in NSW Schools* includes a series of support materials provided on CD, which allows both students and teachers to reflect on the outcomes achieved.
Logging on to the Future – CD-ROM	This resource promotes the usefulness of the *Employment Related Skills Logbook* to students, teachers, parents and employers. It demonstrates how the documenting of vocational skills by students throughout their school years can support them in interviews and applications.
School to Work Training 2003 – Video	The presenter, Paul Baker from TMP Worldwide, provides current information about the changing nature of the workplace, trends in employment and how this impacts on society. He focuses on the skills and competencies that will be required in future workplaces and then demonstrates how schools can help equip students to be better placed to meet the new and emerging world.

5. Vocational and Enterprise Learning Resources

Resource Title	Description
JUMP TO IT: your guide to careers in the Sport and Recreation industry – CD-ROM	This resource covers the four sectors in the Sport and Recreation industry; community recreation, fitness, outdoor recreation and sport. It provides advice to students on steps they can take to research the Sport and Recreation industry and activities they can undertake to test their commitment and interest. A brief background to employment prospects and a profile on business people in the industry is supported by links to appropriate websites.
PowerUp – Your Career in Utilities and Electrotechnology – CD-ROM	This is an interactive, multimedia CD-ROM filled with information on today's Utilities and Electrotechnology industry opportunities. It profiles different workers in the industry and provides insight into their work and training. It incorporates video footage, sound and stills (graphics, photos), and text descriptions of the industry sectors being case studied, as well as links to other information, regarding employment opportunities and training.
WRAPS Careers: What Do You Want To Be? – Video	The aim of *WRAPS Careers: What Do You Want To Be?* is to provide careers advisers, VET teachers and students with information about careers in the Wholesale, Retail and Personal Services industries.
You Can Do I.T. ICT Careers Expo – Video	This video was filmed at the Information and Communication Technology (ICT) School to Work Information Day 2002. It provides Government school secondary students, careers advisers and parents with a range of available career and training options and current industry trends in the ICT field. The video also features interviews with students and ICT personnel in their workplace.
It's Your Business – DVD	This is a DVD resource for students who think that one day they might like to run their own business. It features: • video footage of four young people who are making it, working for themselves. They explain how they did it, the training they had and who helped them • an info bank with advice on how to get started, how to run a business and how to make it grow • quizzes to test individual suitability for business and the dos and don'ts.
Make It in Metal – CD-ROM	This CD-ROM provides information for people considering a career in the Metal Manufacturing and Engineering industry. It is suitable for use with students undertaking research or as a classroom resource. *Make It in Metal* allows students to meet young people in their workplaces, explore different industry pathways, test their knowledge about access to organisations and resources and learn about jobs.
Welcome To Hospitality – CD-ROM	This CD-ROM looks at a sample of the huge number of jobs that make up the hospitality industry, represented here by the hotel, motel, pubs, clubs and restaurant sectors.
Automotive Careers – CD-ROM	This CD-ROM resource provides information to students on a variety of automotive careers through text, video and still pictures. It is sectioned into the areas of Body Repairs, Mechanical Repairs, Sales and Careers.

Useful websites

www.curriculumsupport.nsw.edu.au/maths
Mathematics homepage of the Curriculum K-12 Directorate. Contains links to resources suitable for teachers of mathematics.

www.det.nsw.edu.au/vetinschools
The Vocational Education in Schools Directorate has developed this website for teachers, parents and students to provide information on and links to vocational education.

www.myfuture.edu.au
Australia's electronic career information service.

www.det.nsw.edu.au/vetinschools/schooltowork
Designed for teachers, this website supports the NSW Government's *School to Work Program.*

www.futurefinder.com.au
This website has a career interest test.

www.newapprenticeships.gov.au
A national website for traineeships and apprenticeships. This site contains the most up-to-date information on new apprenticeships including new apprenticeship centres in your region.

http://apprenticeship.det.nsw.edu.au
The Department of Education website lists up-to-date information and statistics on traineeships and apprenticeships in NSW.

www.seek.com.au
One of Australia's leading student and graduate employment and career resource websites, it contains over 35,000 jobs online. Do a 'quick job search' by typing 'mathematics' as a keyword and discover a plethora of jobs available requiring mathematics skills.

www.workplace.gov.au
'Australian Workplace' offers information on employment, workplace relations, Government assistance, jobs, careers, training and wages. It links to **www.jobsearch.gov.au/joboutlook** which contains occupational information such as job prospects and weekly earnings.

www.boardofstudies.nsw.edu.au
This website includes details of the Board of Studies Mathematics curriculum.

www.det.nsw.edu.au
The Department of Education and Training has a 'Training and Industry' link to BVET, Apprenticeships NSW, VETAB, industry programs, training market and new apprenticeship centres.

www.det.nsw.edu.au/vetinschools/jobsalive
The *Jobs Alive* website enables students to read about the career pathway of a profiled worker. The site contains a photo of each worker when they were in Year 10. This helps students better understand that these workers were once their age facing similar decision-making issues.

http://girlswork.det.nsw.edu.au
The site looks at some different jobs in the form of Work Profiles, shares stories of other young women in *Your Stories* and discusses the different paths you can take between education, training, work and careers in *Pathways*. It helps young women explore their options using a variety of material including e-cards, a quiz, news and lots of links.

http://boyzatwork.det.nsw.edu.au
This website explores the broad range of work and career options available to young men. The *Champions* section has interviews with successful young men, *Jobz 4 the Boyz* looks at a number of jobs and careers that young men may not have considered and *Steer Your Career* shows there is more than one way to get from education and training to work and a career. Young men can consider their education, training and employment options by exploring this website and engaging in the quiz, e-cards, news and lots of links.

www.tafensw.edu.au/nsit/nsijobsforthegirls
This website displays images of eight young women in their workplace. The website has a case study on each of the eight young women that details their path into their chosen career. Better jobs and better pay means confidence and financial independence. The website hopes to interest young women in studying courses that will give them the skills and qualifications they need to pursue their career.

5.2.1 *myfuture.edu.au*

The *myfuture* website is a unique, comprehensive, online career information exploration service which is useful for school students and young people making decisions about subject choice, vocational pathways and employment.

The website allows users to refine their career ideas and to explore the skills and qualifications necessary for their desired career path. Information on awards, scholarships and financial assistance for study is also provided to enable users to shape their educational future.

As young people plan their transition from study to work, further education and employment, they can use *myfuture* to explore their interests and acquired skills and discover a variety of relevant career options. Some of these options may be completely new to them. *myfuture* also has information about the labour market, employment conditions and income data for any region of interest throughout Australia.

The detailed occupation descriptions in *myfuture* are very popular with young people. Young people can be better prepared for the workforce knowing what skills are required and what responsibilities and income to expect in particular jobs and careers. This can directly benefit employers, as new employees will have a higher level of confidence that the job they select is right for them.

Enterprising young people interested in identifying business opportunities and wanting to find out more about setting up a small business are also supported on the *myfuture* website.

For teachers, this website complements vocational learning activities in the classroom and is an innovative technological tool for students to explore career options relating to the eight key learning areas. *The Employment Related Skills Logbook* also features an introductory task to the *myfuture* website in the Student section.

With *myfuture*, career planning and development goes beyond the traditional tasks of selecting an occupation, getting a job, progressing in a single occupational field and planning for retirement. Articles and activities in *myfuture* include life planning and emphasise self-awareness, life long learning, career self-management and lifestyle management. Now go to **www.myfuture.edu.au** and explore the possibilities for yourself.

myfuture
Australia's career information service
myfuture.edu.au

5.2.2 *The Real Game Series*

The Real Game series consists of five developmentally sequenced career development and life skills programs. Each program in *The Real Game* series is a stand-alone teaching and learning tool which addresses the *K-10 Curriculum Framework* broad learning outcome: *Students will understand the work environment and have the knowledge, skills and understandings to evaluate potential career options and pathways.* The programs also encourage contemporary assessment for learning practices, provide student personalised learning opportunities and support quality pedagogy.

Each program includes creative role-playing and simulated activities. As a result, students have fun as they learn about life as an adult, exploring life and work roles in the context of their own career development and life planning. The five programs include:

The Play Real Game	suitable for ages 8 – 10
The Make It Real Game	suitable for ages 10 – 12
The Real Game	suitable for ages 12 – 14
The Be Real Game	suitable for ages 14 – 16
The Get Real Game	suitable for ages 16 – 18

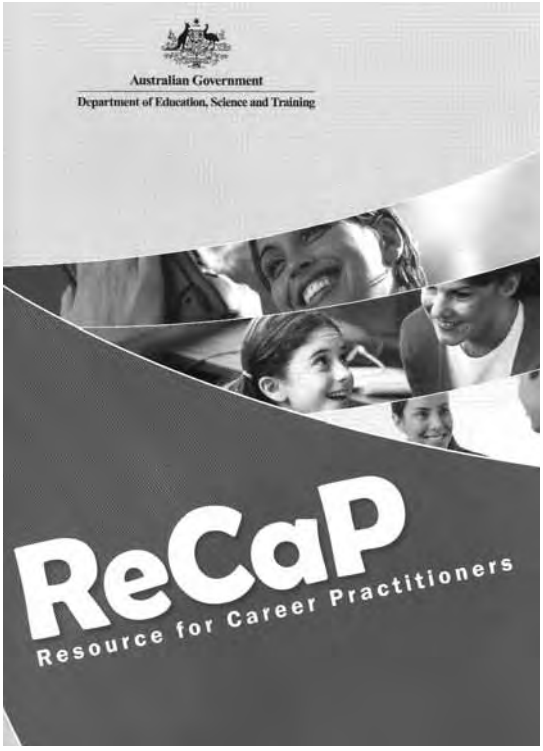
The Real Game series is underpinned by five internationally acknowledged career development themes known as the *High Five*, which have recently been incorporated into the draft prototype of the *Australian Blueprint for Career Development*. These principles are:

- **Focus on the journey**, not the destination
- Know yourself, believe in yourself and **follow your heart**
- You're not alone. **Access your allies**, and be a good ally
- **Change is constant**, and brings with it new opportunities
- **Learning is lifelong**, and it's good. We are most alive when we are learning.

A CD-ROM entitled *Logging the Real Game in NSW Schools* has been developed for teachers to help students identify and record their employment related skills acquired through participation in *The Real Game*. Other features of this resource include: *The Real Game* log sheet and the employment related skills certificate. The sessions and units of *The Real Game* have been mapped against the objectives and outcomes of Stage 4 NSW Board of Studies Commerce, English, Maths and PDHPE syllabuses to show how the program can address course delivery needs across a range of key learning areas.

To access the required teacher training or for more information on *The Real Game* series or *Logging the Real Game in NSW Schools*, contact your Vocational Education Consultant. For more general information about the series or to order products visit the Australian Real Game website: **http://realgame.dest.gov.au**

5.2.3 *Links to ReCaP*



ReCaP (Resource for Career Practitioners) is a quality teacher initiative under the *Australian Government Quality Teacher Program*. The resource provides careers advisers with information about current theories and policies relating to career development. It also provides the most up-to-date information about national programs, resources and materials, and has sections to enable users to include state, local and personal content. *ReCaP* was distributed to all NSW careers advisers in 2004.

The resource contains a series of student activities as black line masters for photocopying. A CD-ROM is also included with electronic versions of all worksheets that allow teachers to customise them to suit individual student needs. Worksheets can also be stored on a school's intranet.

The activities are aligned with the sections covered in the *Employment Related Skills Logbook* and would enhance students' entries and use of the logbook. The set of employment related skills outlined in *ReCaP* align with those listed in the logbook.

ReCaP can be downloaded from the following website: **www.dest.gov.au**

Home>Career Development>Publications & Resources>Publications A-Z>R>ReCaP:resource for career practitioners**.** Scroll down to Availability and click on HTML.

5.3 Enterprise resources and activities

For more information on enterprise activities and programs that students may wish to participate in, visit the websites listed below.

www.schools.nsw.edu.au/events/statecompetitions/webawards

The Department of Education and Training's Annual Schools Web Design Awards encourage teachers and students to become familiar with web design tools and to immerse themselves in communication technologies. Entering the awards is an excellent way of involving your school in these technologies. The competition is a fantastic way for students to create an educational resource for a world wide audience.

www.curriculumsupport.nsw.edu.au/technology/myda

The Minister's Young Designer Awards (MYDA) promotes innovative Stage 4 Design and Technology. The MYDA encourages students to look at the world around, to investigate products, systems and environments, and to design a successful solution in an area of interest to them. The awards are open to students in Years 7 and 8 in Government and non-Government schools in NSW, either as individual entries or as small group (maximum of six) entries. The challenge offered to students is to develop a project that meets a clearly identified need.

www.mindshop.com.au/mswebpage.nsf/pages/excellence

Mindshop Excellence is a five day work experience program aimed at Year 10 students. A team of six students will visit a host organisation. Facilitators will train students in business processes. Students will then be given a real workplace issue to solve over the course of the five days. The team will present their solution to management, staff, parents and teachers.

www.youth2youth.com.au

Youth 2 Youth run skill based workshops in school or outside school that equip young people with career, enterprise and business skills. They develop two free publications, *Frank* for young women and *Ignite* for all youth – they highlight opportunities, list contacts and provide inspiration for enterprising young people. The site provides youth information and hotlinks to many other sites.

www.anpf.cit.act.edu.au

Australian Network of Practice Firms. A practice firm is a virtual business set up and run by students with support from teachers and a mentor business partner. Practice firms trade in a virtual economy with other practice firms in the network and can attend and participate in trade fairs at a local, regional, state and national level.

www.takethechallenge.com.au

Energy Australia Red Cross Youth Challenge invites young people, their teachers and members of the community to take the challenge by finding a project that helps the community. Groups work together on a project gaining skills in project management, problem solving, research and communication. The site lists available projects or students can come up with their own.

www.sustainableliving.com.au

Sustainable Living Competition is an annual competition for high school students to undertake environmental projects in the classroom individually or by entire school communities. More than $30,000 in prizes.

www.yaa.org.au

Young Achievement Australia (YAA) offers two programs. Business Skills is aimed at Year 11 students. Groups of 20 to 25 students run their own business under the mentorship of a host organisation and take responsibility for all decisions. The program is run over 16 to 24 weeks generally outside school hours. Students can achieve a Certificate II in Business. Business Enterprise is for Years 8-10 students and introduces them to the world of business. Generally conducted in Commerce, Business or Work Education classes.

www.asx.com.au/sharegame

ASX Schools Sharemarket Game is available to students in Years 7-12. Students form a syndicate of two to four students. Each syndicate is provided with an imaginary $50,000 to invest in shares. This hands on experience of the share market will see you involved in internet "share trading" over a 10 week period.

www.austrade.gov.au/studentcentre

Austrade Export Plan Competition is a five week hands on unit where students study business with global potential. Students can apply business, economic and marketing theory and consider the global potential and small business opportunities in their own local area.

www.abw.org.au

Australian Business Week (ABW) offers students several programs. The in-school program is an intensive five day program (involving all Year 10 or 11) where groups of 10 students form a simulated company and assume the key roles of that company's employees. This culminates in the production and marketing of a product at a trade fair.

www.csiro.au/crest

CREST (Creativity in Science and Technology) provides students with a nationally accredited award for completing science or technology research projects. Projects are offered at different levels. Links are made with industry or community workers so students gain an understanding of the role of science and engineering in the community.

www.enya.org.au

The Enterprise Network for Young Australians (ENYA) promotes the active participation of young people (aged 15-30) in enterprise in an ethical and sustainable manner. It can assist them to set up their own enterprise by directing them to funding opportunities, mentors and training. ENYA has links to many other sites targeting youth.

www.govolunteer.com.au

Go Volunteer provides young people with all the information necessary if they are considering volunteering or seeking volunteer opportunities in their local area.

www.youthgas.com.au/about

Youthgas provides timely and accessible youth information/opportunities, a space for younger voices to be expressed and a place for people to share and learn about issues and concerns.

www.youngaustralians.org

The Foundation for Young Australians is committed to developing innovative initiatives that support and empower the lives of young Australians aged 12-25. They provide seed funding and help young people develop their ideas.

www.myownbusiness.org

My Own Business site is a free Internet business course on starting up and operating your own business. It offers resources, forum and chat, various courses and helpful information geared toward successful business.

www.highschoolstartups.com

High School Start Ups is designed to encourage enterprising young people. It provides useful information for students thinking about establishing their own business or a partnership business.

5.4 *Teachers in Business* – an opportunity for teachers

The Teachers in Business Program (TIB) provides teachers with work opportunities outside of school that will enhance their own industry/business experience and vocational learning. It will allow teachers to add value to curriculum delivery as they transfer the knowledge and skills learnt during the placement back into the classroom. It is also a means by which teachers can forge valuable links to industry for their school.

All teachers K-12 are eligible to apply for this program. Teacher relief is available to support teacher placements during school time. Teachers negotiate their placement with a suitable organisation or are 'matched' with the support of industry.

Teachers need to clearly outline how the placement will enhance their teaching. Examples include:

- Project management for leadership roles
- Business organisation
- Career pathways in a business or industry
- Examining new and emerging technologies in a specific industry area
- Event management that will assist in planning school or local events
- Examining ways in which industry and school can work together
- Examining services available to students when they leave school
- Investigating a range of support services for students with special needs
- Working with practice firm business mentor.

Teachers will be required to share their learning with others at the school, local or regional level.

Contact your local Vocational Education Consultant for the Guidelines and Application form.

Notes